

SENTINEL INJURIES

4th Annual Child Abuse Conference
 Mercy Hospital
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Sentinel Injuries in Infants Evaluated for Child Physical Abuse

RELATIVELY MINOR ABUSIVE INJURIES CAN PRECEDE SERIOUS PHYSICAL ABUSE IN INFANTS

Sentinel Injuries in Infants

Sheets, et al, Pediatrics 131(4) 2013

- ⊙ Sentinel injury: a previous injury reported in the medical history that was suspicious for abuse because the infant could not cruise, or the explanation was implausible.
- ⊙ Abused infants more often had a previous history of sentinel injuries when compared with infants who were not abused.

Sentinel Injuries in Infants

Sheets, et al, Pediatrics 131(4) 2013

- ⊙ Case-control, retrospective study of 401 infants under 12 months old evaluated for physical abuse in a hospital based setting.
- ⊙ Of 200 definitely abused infants, 27.5% had a previous sentinel injury.
- ⊙ None of the non-abused group had sentinel injuries.

Sentinel Injuries in Infants

Sheets, et al, Pediatrics 131(4) 2013

- ⊙ The type of sentinel injury in the definitely abused cohort was bruising (80%), intraoral injury (11%), and other injury (7%).
- ⊙ Sentinel injuries occurred in early infancy: 66% by 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.

Definition of Sentinel Injury

- ⊙ -Visible/detectable injury reported to have been to at least one parent prior to the events leading to the current admission
- ⊙ -Occurred at an age when the infant could not cruise and injury was unexplained or poorly explained
- ⊙ -Example: 6-month old infant with abusive head trauma
- ⊙ -healing rib fractures (not sentinel injuries)
- ⊙ -history of an unexplained cheek bruise at 2 months of age

Sentinel Bruises/Oral Injuries Precede Serious Abuse

Ask about prior bruises or blood coming from the mouth

SENTINEL
INJURIES ARE
MEDICALLY
MINOR BUT
FORENSICALLY
SIGNIFICANT!

Facial Bruising as a Precursor to Abusive Head Trauma

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- ⊙ Bruising is most common presentation of child abuse in infants
- ⊙ Bruising occurs in <1% of precruising children
- ⊙ Often a precursor injury to abusive head trauma
- ⊙ Facial/head bruising is highly suspicious for abuse in children < 6 months old
- ⊙ A systematic review by Maguire et al, the head, and in particular the face, was the most common site for abusive bruises

Incidence of Bruising

- ⊙ Bruises are uncommon in infants younger than 6 months.
- ⊙ ANY bruising in young infants should raise concern for possible child abuse.
- ⊙ "Those who don't cruise rarely bruise."^{**}

^{**}Sugar NF, et al. *Arch Pediatr Adolesc Med.* 1999;153:399-403.

Consider: Age vs. Development

When should a bruise create suspicion for abuse?

- ⊙ **•Pattern-** bruise that has a recognizable shape or pattern or
- ⊙ **•Location-**bruise in unusual location (anywhere on a young infant or in protected locations such as (ear, hand, neck, buttocks, inner thighs) or
- ⊙ **•Age/developmental stage of the infant –** bruising is unexpected before an infant can cruise (pull to a stand and take steps while holding on)

Bruising in an infant

- ⊙ Bruises in non-ambulatory infants should raise suspicion for child physical abuse.
- ⊙ Children under 2 years of age with suspicious bruising should receive a full skeletal survey and may also warrant intracranial imaging.
- ⊙ Facial bruising can be a warning sign of occult head trauma.

Jenny C, et al: Analysis of missed cases of abusive head trauma. *Journal of the American Medical Association* 281:621-626, 1999.

- ⊙ To characterize head injured children in whom diagnosis of abusive head trauma (AHT) was unrecognized and the consequences of the missed diagnoses.
- ⊙ Race: 37.4% of cases of AHT in white children were missed versus 19% of cases of AHT in non-white children.
- ⊙ Family composition: 40.2% of missed cases were children from intact families versus 18.7% of missed cases who were children whose parents were not living together.

Isolated Bruising – Is It Abuse?

Harper NS et al. J Pediatr 2014;165(2):383-388

- Isolated bruising in 254 infants less than 6 months old evaluated for abuse
- -50% have other serious injury identified on skeletal survey, neuroimaging or abdominal injury screening.
- -70% were screened for bleeding disorders and none identified

CONCLUSIONS:

- Infants younger than 6 months of age with bruising prompting subspecialty consultation for abuse have a high risk of additional serious injuries. Routine medical evaluation for young infants with bruises and concern for physical abuse should include physical examination, skeletal survey, neuroimaging, and abdominal injury screening.

Harper NS et al. J Pediatr 2014;165(2):383-388

Highly Suspicious Bruises

- Bruises behind or on the ear
- Genital bruising
- Large areas of bruising usually well protected
- Patterned bruising
- Bruises in various stages of resolution

Accidental vs. Abuse

Many characteristics can help separate abusive from accidental bruises. Two of the most important features used to distinguish between accidental and abusive injuries are:

- 1) LOCATION
- 2) PATTERN

Typical Locations of Bruises

ACCIDENTAL	ABUSIVE
Shins	Upper arms
Lower arms	Upper anterior thighs
Under chin	Trunk
Forehead	Genitalia
Hips	Buttocks
Elbows	Face
Ankles	Ears
Bony prominences	Neck

“Triangle of Safety”

The diagram illustrates the 'Triangle of Safety' on a child's torso. The vertices of the triangle are the shoulders and the waist. The text states: 'Bruising in this area is suspicious for abuse.' Other anatomical markers shown include the umbilicus and the xiphoid process.

Aging of Bruises

- ⊙ Studies that have looked at the ability of clinicians to accurately age/date bruising have shown that clinician accuracy is rather poor.*

* Maguire, S et al. *Arch Dis Child* 2005;90: 187-189

Aging of Bruises

- ⊙ Due to variability in skin thickness, amount of subcutaneous fat, vascularity of underlying tissue, amount of force applied, depth of bruise, the mechanism of contact, underlying skin color and a variety of other factors, the aging of bruises is an inexact process and the use of color to determine how old a bruise is should be avoided.
- ⊙ Bruises of the same age on the same person can vary in color.

*Banciak, E. et al *Pediatrics* Vol 112 No. 4 October 2003

Pinch mark

- ⊙ Forceful pinching is a form of excessive discipline and in this case is likely associated with potty training.
- ⊙ **Unrealistic expectations for child development is a risk factor for child physical abuse.**
- ⊙ Another area where pinch marks occur are the ears. Looking for bruising of the helix and behind the pinna can be helpful in identifying child physical abuse.

Torn frenulum

- ⊙ Laceration of the frenulum in a non-cruising infant is highly concerning for abuse. Typically, these injuries are sustained when a caregiver becomes frustrated and force-feeds a child.

Loop Marks

- ⊙ Loop marks are caused by a an implement (such as a belt, rope or extension cord) that is bent double and used to strike the skin.
- ⊙ Loop marks are generally worse at the curved end due to faster travel speed around the hand of the person inflicting the injury.

Workup for "occult" injury

- ⊙ Complete, disrobed physical examination- photo-documentation of injuries.
- ⊙ Full skeletal survey up to 2 years of age,
- ⊙ Neuroimaging (CT or MRI) up to one year of age.
- ⊙ Dilated ophthalmological examination (if neuroimaging is positive for head injury).
- ⊙ AST/ALT if over 80- get an abdominal CT....

Key Points

- ⊙ •Ask about sentinel injuries
- ⊙ •Examine infants in good light and completely undressed
- ⊙ •Pay attention to minor injuries – ask questions
- ⊙ •Perform full work-ups – unless injury is clearly explained by history
- ⊙ •Offer resources to parents of distressed infants