

SENTINEL INJURIES AND CHILD ABUSE

When the Minor is Major
Jackie Collard RN, BSN, MS, PNP
Child Advocacy Center of Niagara

A SENTINEL INJURY IS A POORLY EXPLAINED MINOR INJURY IN A NON-MOBILE INFANT



- They are medically minor, will heal on their own
- They are suspicious, therefore forensically significant

SIGNIFICANCE



Pediatrics reported that one hospital's experience with nearly 200 abused children found that almost 1 in 3 had been seen previously by a medical provider with a sentinel injury

SIGNIFICANCE



- Approx. 30% of cases of AHT are missed initially (mean time to dx is 7 days, mean number of visits about 3)
- Approx. 20% of abusive fractures are missed initially
- Many of these children subsequently present more severely injured or dead
- Jenny et al., 1999; Ravichandiran et al., 2010

SIGNIFICANCE OF IDENTIFICATION




- N Harper Journal of Pediatrics 2014
- 146 infants <6m presented w isolated bruising
- 73 out of the 146 had additional serious injury identified (50%)
- SS found new injury in 34 (23%)
- Neuroimaging found new injury in 40 (27%)
- Abd injury found in 4 (3%)
- 103 had coagulation studies and no bleeding disorders identified

TYPES OF SENTINEL INJURIES




- **Bruising 80%**
- Intra oral injury 11%
- Fracture 7%
- Sheets et al., 2013

SKIN




- **Epidermis:** compact firm outer layer not easily damaged
- **Dermis:** capillaries and fibrous tissue resistant to damage
- **Subcutaneous tissue:** rich in capillaries and fat easily deformed most hemorrhage occurs here

DEFINITIONS



- **Bruise:** bleeding beneath intact skin from blunt force trauma
- **Ecchymosis:** blood that has moved through tissue planes to become externally visible
- **Petechiae:** small flat red or purple spots caused by a rupture of capillary blood vessels


NORMAL VS ABNORMAL



- Age
- Development
- Location
- Object used ?
- Rate of force behind the object
- Deeper bruises may take days to appear
- Superficial bruises appear earlier
- Cannot date a bruise
- Healing time varies with location


Pekarsky 2018

HIGH RISK FOR ABUSE



- Young children 0-2
- Children any age with disabilities (dependence on caregivers)
- IPV in home
- Substance abuse in home
- Unrelated male caregiver in the home
- Prior history of physical abuse

RED FLAGS



- Any injury in a child that is inconsistent with the history
- Injury that is inconsistent with child's developmental level
- Pattern injuries to skin

Screening tool for NAI
Adapted from Pediatrics September 2012, VOLUME 130 / ISSUE 3 *Effects of Systemic Screening and Detection of Child Abuse in Emergency Departments*

1. Is the history consistent both initially and then when repeated?	Yes	No
2. Was seeking medical help unnecessarily delayed?	Yes	No
3. Does the injury fit with the developmental level of the child?	Yes	No
4. Is the behavior of the child and his or her caretakers appropriate?	Yes	No
5. Is the head-to-toe exam consistent with the history provided?	Yes	No
6. Are there other signals that make you doubt the safety of the child or other family members?	*Yes	No
*Please explain if answer is yes to question 6		
If you answered any question in RED Contact CPS and the child abuse team	Hotline 1-800-635-1522	Hospital Child Abuse Team

PRACTICE NOTES



- TEN-4 bruising
- This is bruising in
- **Torso**
- **Ear**
- **Neck**
- **In children up to 4 or ANY** bruise in an **infant 4 months old or younger**
- Sensitivity of 97% and specificity of 84% for predicting abuse Pierce, et al. 2010

WHY TEN?



- **Torso:** lots of cushion to absorb injury forces
- **Ears:** difficult to bruise not very vascular
- **Neck:** protected by shoulders

ONE STEP FURTHER



- **TEN 4 FACES**
- **F**renulum
- **A**uricular area
- **C**heek
- **E**yelid
- **S**clera

• Pierce, et al. 2010

SENTINEL INJURIES ARE AS CLOSE TO A CRYSTAL BALL AS WE CAN GET



- We have to improve identification
- When you identify one, then what?

WORK UP AND REPORT



Even if admission not indicated, safety plan CPS involvement and PMD follow up could significantly change outcome

WORK UP



- Non-mobile infants
- Children under 2
- Siblings of abused children

WORK UP



May require...

- Skeletal survey (0-2 yrs all)
- >2-5 yrs at provider discretion
- >5 focused on affected areas

- Neuro imaging
- Child 0-2 with TEN-4 bruising or rib/skull fx
- Child with altered mental status or abnormal neuro exam
- Infants under 6 months with a witnessed shaking event

WORK UP



May require...

Labs

Abdominal injury suspected LFTs
amylase lipase

All children 0-2 years with abdominal bruising, distention, discomfort, or suspicious injury

Any age child with abdominal bruising, discomfort

IMAGING AND LABS



Sentinel injury or if injury does not match history


- Head CT if < 1yr
- Skeletal survey (repeat in 2 weeks)
- If > 2 yrs targeted x-rays as indicated
- Potential SS up to 4 yrs

Fam hx
Bleeding d/o suspected CBC PT PTT
Consider factor 8 9 and Von Willebrand

Lamb, 2015

FOLLOW UP



- Follow up skeletal survey (FUSS) 
- 2 weeks from original might show us injuries that were not detectable in acute phase
- Follow up appointments with ortho/neuro/CAC are important and must be attended

SIBLINGS



- Twins
- SS if sibling < 2 yrs of age
- Consider head CT if < 1yr

PRACTICE NOTES



- Full skin examination essential
- Consider injuries in relation to child mobility
- Complete the medical work up for suspicious bruising or if injury does not match history
- Utilize TEN 4 rule
- REPORT | 800 635 1522

THOSE WHO DON'T
CRUISE RARELY BRUISE



Those who **do** cruise and walk usually have bruises on shin, knee, forehead, upper leg

CASE



- 4 mo female presented to ER with "black eye" from being forcefully pulled from her infant carrier.
- Common pitfalls:
 - She was "happy eating and sleeping normally"
- Transferred to OCH

SS REVEALED 12
SUBACUTE FRACTURES



QUESTION FOR THE GROUP



- What is the indicated medical work up for a 4 month old healthy infant with a bruise on his abdomen?
- 1. Skeletal survey
- 2. Head CT
- 3. LFTs amylase lipase
- 4. All of the above

Lamb 2015

WHICH OF THE FOLLOWING IS CONCERNING FOR ABUSE?



- 1. Chest bruise in a 3 year old active boy?
- 2. Anterior shin bruise in a 3 month old boy?
- 3. Ear bruise in a 2 year old girl
- 4. 2 and 3
- 5. All of the above

Lamb 2015

[HTTP://WWW.CHILDRENSMERCY.ORG/CHILDPROTECTOR](http://www.childrensmercy.org/childprotector)

Medical and non-medical portals

Fractures

4. Are there significant injuries to other body parts?

Yes

No

5. Are there siblings or other children in the same home environment that are < 5 years of age?

Yes

No

6. How old is the child?

< 6 months of age

6 months to 24 months of age

2-5 years of age

> 5 years of age

Submit

THANK YOU FOR EVERYTHING YOU DO!

REFERENCES

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Session Evaluation can be completed at
https://www.surveymonkey.com/r/PedsSeminarEval_Session3

REMAINING PEDIATRIC SEMINAR WEBINARS

<https://www.eventbrite.com/e/21026wmpgs-pediatric-emergency-airway-management-seminar-webinar-series-registration-106793592024>

Pediatric Emergency Airway Management
October 27, 2020 @ 9:00am- 10:00am

Pediatric Shock: How to Tell if it is Sepsis or Trauma
November 10, 2020 @ 9:00am- 10:00am

Pediatric Mock Code and Mock Trauma
November 24, 2020 @ 9:00am- 10:00am

PEDIATRIC SEMINAR RECORDED SESSIONS

All sessions will be recorded and available at:
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