Early Identification and Initial Management of Child Physical Abuse

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Overview

1) Physical Abuse
2) Abusive Head Trauma
3) Medical Workup/ Initial Management
4) CARE Team Structure and Referral
Physical Abuse

• Recognize characteristics of abusive skin findings and differentiate these from accidental bruising in childhood

• Identify skeletal injuries which indicate high risk for abuse
Bruising

Most common presenting feature of physical abuse

- May have extensive internal injuries without any external bruising
- Undress the child
- You cannot date a bruise
- Boys and girl bruised equally
- Only 2% of precrawlers have bruising; 52% of walkers have bruising
“Those who don’t cruise rarely bruise”

**Accidental Bruising**
- Mobile kids
- Common sites include forehead, shins, knees
- Usually isolated and small on bony parts of the body

**Inflicted Bruising**
- All ages
- Common sites include the head, face, ears, back, trunk, buttocks
- Often clustered, on soft parts of the body, and often defensive and/or patterned
TEN4 Rule: Location and Age

Pierce and her colleagues (2010) created the TEN-4 rule from their study of children admitted to an intensive care unit with inflicted or non-abusive injury.

There is concern for abuse if

- Bruises on Torso, Ears, or Neck (TEN) in children 4 yrs or younger
- ANY bruise on an infant 4 months or younger
TEN4FACES

- **T** = Torso (chest, abdomen, back, buttocks, genitals)
- **E** = Ear
- **N** = Neck
- **Child 4 years or younger or ANY bruising on a child 4 months or younger**
- **F** = Frenulum
- **A** = Auricular
- **C** = Cheek
- **E** = Eyelid
- **S** = Sclera

Outcomes of TEN4

• This bruising clinical prediction rule had a 97% sensitivity and 87% specificity for predicting abuse.

• 72% of AHT cases had TEN4 bruising

• KEY= Bruises can be subtle but valuable clues to serious injury.
Petechiae

- Petechiae are pinpoint hemorrhages in the skin believed to arise from rupture of venous capillaries.
- May be caused by medical conditions, elevated venous pressure (severe coughing, vomiting, or strangulation), or blunt force trauma.
- Bruises associated with petechiae are much more common in abuse (Nayak 2006; Kemp 2014).
Sentinel Injuries in Pre-mobile Children

• Infants seriously injured from abuse have often had prior bruises but had not been protected (Feldman 2009; Jenny 1999; Pierce 2009).

• 27.5% of 200 infants with AHT had been seen with a sentinel injury (bruising in 80%), whereas none of 101 infants with non-abusive head trauma had prior bruises (Sheets 2013).
Sentinel Injuries in Pre-mobile Children

- In 2014, 146 infants with apparently isolated bruising, who were then evaluated for abuse, were studied.
- 50% had one or more serious injuries identified—mainly fractures or cranial injuries, but abdominal trauma was also identified.
Skeletal Injuries

• Fractures are the second most common inflicted injury.
• Most abusive fractures are in children under 1 year (69%)
• Most are occult (unsuspected)
• Start thinking about NAT when:
  – The child is nonambulatory
  – Injury inconsistent with child’s development
  – Mechanism of injury is inconsistent with the history
  – Changing history
  – Lack of history
  – Injury is attributed to the child’s siblings
  – Healing fracture with delay in seeking medical care
  – Fracture associated with other injuries
Skeletal Injuries: Specificity for Abuse

- **High specificity fractures**
  - Classic Metaphyseal Lesions
  - Rib fractures, especially posterior
  - Scapular fractures
  - Spinous processes fx
  - Sternal fractures

- **Moderate specificity fractures**
  - Multiple, bilateral, symmetric
  - Fractures of different ages
  - Complex skull fractures
  - Digital fractures
  - Associated non skeletal injury
  - Fracture in non mobile child

Kleinman 1998
Skeletal Injuries: Specificity for Abuse

• Common abusive injuries with low specificity:
  – Subperiosteal new bone formation
  – Clavicle fractures
  – Long bone shaft fractures
  – Linear skull fractures
Skeletal Injuries: Rib Fractures

- Usually unsuspected in children <2yrs
- Common fracture in abuse; *rarely* non-inflicted
- Highly associated with head trauma
- Mechanism of chest compression
- Acutely hard to identify
- May help to
  - Repeat skeletal survey or get chest CT
Skeletal Injuries: Classic Metaphyseal Lesions

• CML Fractures
  – Subtle on x-ray
  – Difficult to date
  – High specificity for abuse
    • Pull and twist
    • Shaking
Spiral Fractures

- Once believed to be highly associated with abuse.
- Not any more! A spiral fracture in itself is not diagnostic of abuse.
- Can occur from seemingly innocuous trauma.
- Spiral fractures in a nonmobile child should raise concern for abuse.
- Spiral fractures in abuse are caused by the child’s limb being pulled and twisted.
Skull fractures

- Simple linear skull fractures are common in accidental and abusive skull fractures
- About 1/3 of skull fractures in children <3yrs are caused by abuse
- Short falls (most of the time) cause simple fx, no underlying brain injury, no neurologic sequelae
- Increasing concern of abuse if given hx of minor trauma:
  - Complex fracture
  - Depressed
  - Diastatic (>3mm)
  - Bilateral
  - Underlying brain injury
Skeletal Survey

Indications:

- Age under 2 years old with concern of physical abuse
- Any nonmobile infant with a fracture (even if explained)
- Abusive Head Trauma (AHT)
- Sibling <2yrs of an abused child
- Infants with profound neglect

- Should include oblique ribs and coned down views of the elbows, wrists, ankles, knees
- Repeat in 2 weeks to pick up missed acute fractures and help date injuries
Babygrams are not acceptable!!
Key Points on Fractures

• Most inflicted (abuse) fractures look like accidental fractures and can be explained away by the “right” history

• Spiral fractures are not accidental in non-ambulatory children

• CMLs and rib fractures are highly specific for abuse

• If a baby has rib fractures, look for intracranial injuries

• OI is extremely rare, abuse is common

• Skeletal survey for children <2yrs with abuse concerns
Key Points: Physical Abuse Red Flags

– No history of trauma
– History of a minor fall/ trauma
– Blaming serious injuries on CPR, pets, young siblings
– Changing/inconsistent history
– Developmentally incompatible history
– Delay in seeking medical care
Objectives: Abusive Head Trauma

- Understand the definition and common mechanisms of AHT
- Describe injuries associated with AHT
- Review the epidemiology of AHT
- Outline risk factors for AHT
- Identify subtle signs and symptoms of AHT
- Review other physical exam clues
What is Abusive Head Trauma (AHT)?

• A subset of closed head injury and can be inflicted by multiple mechanisms
• Leading cause of death from abuse in the United States
  • 1300 children reported each year
  • 25% die
AHT: Mechanism of Injury

**Diffuse Brain Swelling:** Direct injury to the brain itself
Immediate neurologic changes and cardiorespiratory deregulation

**Subdural Hemorrhage:** Vessels torn by shearing forces
Can cause increased intracranial pressure
AHT: Frequently Associated Injuries

Retinal hemorrhages
Rib fractures
Classic Metaphyseal Lesions (CMLs)

** Serious internal injuries without external injuries!**
Epidemiology of AHT

The incidence and prevalence of AHT is unknown.

Anonymous random phone survey of mothers in North Carolina with children under 2 yrs of age

– Approximately 1% reported shaking their infants
– This would suggest that shaking is 54 times the rate of severe AHT observed in the same state

Zolatar 2008
Missed AHT

• Jenny et al. completed a retrospective chart review of pediatric head trauma cases presenting over a 5 yr period
• Objective: Determine how frequently AHT was previously missed by physicians and determine factors associated with the unrecognized diagnosis

• 173 children <3 yrs with AHT were reviewed
Missed AHT

51 children with NO neurological symptoms screened with Head CT because of other suspicious injuries = 37% had intracranial findings.

We know that many children with AHT have no symptoms and are likely to be missed.

31% of AHT victims had seen a clinician for symptoms of head trauma before diagnosis, and AHT was initially missed.

We know that many children present with subtle or nonspecific signs of AHT which can be easily missed.
Missed AHT: Results

• Mean time to correct diagnosis was 7 days (0-189 days)
• Physicians were more likely to miss
  – normal respirations
  – no seizures
  – no visible facial or head injuries
  – victim was from a white, two parent family
• In the study, 15 children (27.8%) of the victims were reinjured after a missed diagnosis.

• Ultimately, it was determined that 4 out of the 5 deaths in the group with unrecognized AHT might have been prevented by earlier recognition of abuse.
Approach to Detection of AHT

- Add AHT to the DDX: A high degree of suspicion is warranted!
- Screen for Risk Factors
- Clinical Assessment
- Physical Exam Tip Offs
- Additional Medical Evaluation
- Report and Refer if warranted
Risk Factors of AHT

Societal Factors
• Poverty
• Family disruption (military deployment)
• High stress, low social support

Family Factors
• Young maternal age
• Single mother with unrelated male caregiver in the home
• Parental depression
• Domestic violence
• Substance abuse
• Prior abuse in the family

Adult Characteristics
• Men = Women on self-report studies
• Men identified >60% of the time in hospitalized patients

Child Characteristics
• Male infants
• Young age: 2-6mo
• Multiple gestation
• Prematurity
• Colic/ fussiness
Clinical Assessment: Signs and Symptoms of AHT

- Irritability - high pitched cry
- Loss of appetite
- Vomiting
- Altered sleep pattern
- Seizures
- Altered LOC
- Changes in tone
- Cardiorespiratory compromise

*These symptoms can be sudden and severe or subtle and lingering.

First responders be aware of a healthy baby with sudden decompensation.
Physical Exam Findings

• Alterations in vital signs
• Full or bulging fontanelle
• Enlarging head circumference
• Abnormal neurologic exam
• TEN4FACES
• Signs of Neglect
  – FTT
  – Poor hygiene
  – Lack of medical care or unaddressed medical problems
Objectives: Medical Evaluation

You are concerned that your patient may have been abused....

• Develop a practical approach for initial management and when to refer
• Review guidelines for initial medical workup in a physical abuse evaluation
Initial Management

1) Take steps to ensure safety
   – Have a protocol in place at your facility
     • Develop in conjunction with DCF and Law Enforcement (LE)
     – Make a mandated report to DCF (+/- LE)
     – Strongly consider admission to the hospital (local or transfer). These are trauma patients.
       • Use transport; private vehicle is risky

2) Initiate additional medical workup as needed
   – This is easier to do with child in the hospital

3) Consult CARE team
DCF versus 911

• Role of 911
  – Immediate response
  – 24/7
  – Anonymous report

• Role of Department of Children and Families (DCF)
  – 1-800-922-5330
  – 24/7
  – Anonymous report
  – [http://www.dcf.ks.gov/Pages/HotlineNumbers.aspx](http://www.dcf.ks.gov/Pages/HotlineNumbers.aspx)
Skeletal Survey

Indications:

- Any child with concern of abuse age < 2 years old
- Selected cases over 2 years
  - Severe physical abuse (head trauma)
  - Developmentally delayed/ nonverbal
- Consider if profound neglect or significant DV in the home

**Babygram does not count!**
Non-contrast Head CT with 3D

Indications:

- AHT remains on the DDX after you have reviewed the clinical picture
  - Neurologic symptoms
  - Suspicious injuries (TEN4FACES, fractures) in a child under 1 yr of age (have a low threshold)
Ongoing Workup (Inpatient)

- Ophthalmology exam (if possible)
- If bruising: CBC, PT, PTT
- If severely beaten: urine for myoglobin, CPK
- Screen for abdominal trauma: LFTs, FAST
- Screen bone health: Ca, Phos, Alk Phos, PTH, Vit D levels
- If possible drug exposure: UDS
- Forensic photography
Objectives: CARE Team

• Introduce the CARE team and role of the Child Abuse Pediatrician
• Identify how to contact the CARE team and/or refer a patient
• Discuss next steps in serving outlying communities
Child At Risk Evaluation Team

• The CARE Team Physicians:
  – Kathy Melhorn, MD, CARE Team Chair
  – Kerri Weeks, MD
  – Beth Heflin, MD

• MDT:
  – Hospital staff (forensic nursing, case management)
  – DCF
  – Law enforcement
  – District attorney’s office
  – PCPs
  – Mental health professionals
  – Local CAC
CARE Team Doc Role

• Ensure a comprehensive evaluation
• Explain the medical findings to nonmedical team members
• Coordinate follow-up
Consultation

• Phone Consultation: page 24/7 through the Wesley operator (962-3030)
• Inpatient Consultation: both hospitals 24/7
• Outpatient Consultation: sexual abuse, neglect, drug exposure, long-term physical abuse. Dr. Weeks available for outpatient evaluations at Wesley (962-9122)
Contact Information

• Kerri Weeks, MD
• Kerri.weeks@wesleymc.com
• Clinic: 316-962-9122
• Page through WMC operator