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# PHYSICAL ABUSE INJURIES

# Agenda

- ◎ First Things First
  - First Clues
- ◎ The Iceberg Concept
- ◎ Specific Injuries
  - Bruising in Infants and Children
  - Burns
  - Fractures
  - Abusive Head Injury

# Hinkiness

## ◎ Hinky

- The instant of knowledge when one becomes deeply aware there is...evil...  
afoot.

Urban Dictionary

# First Things

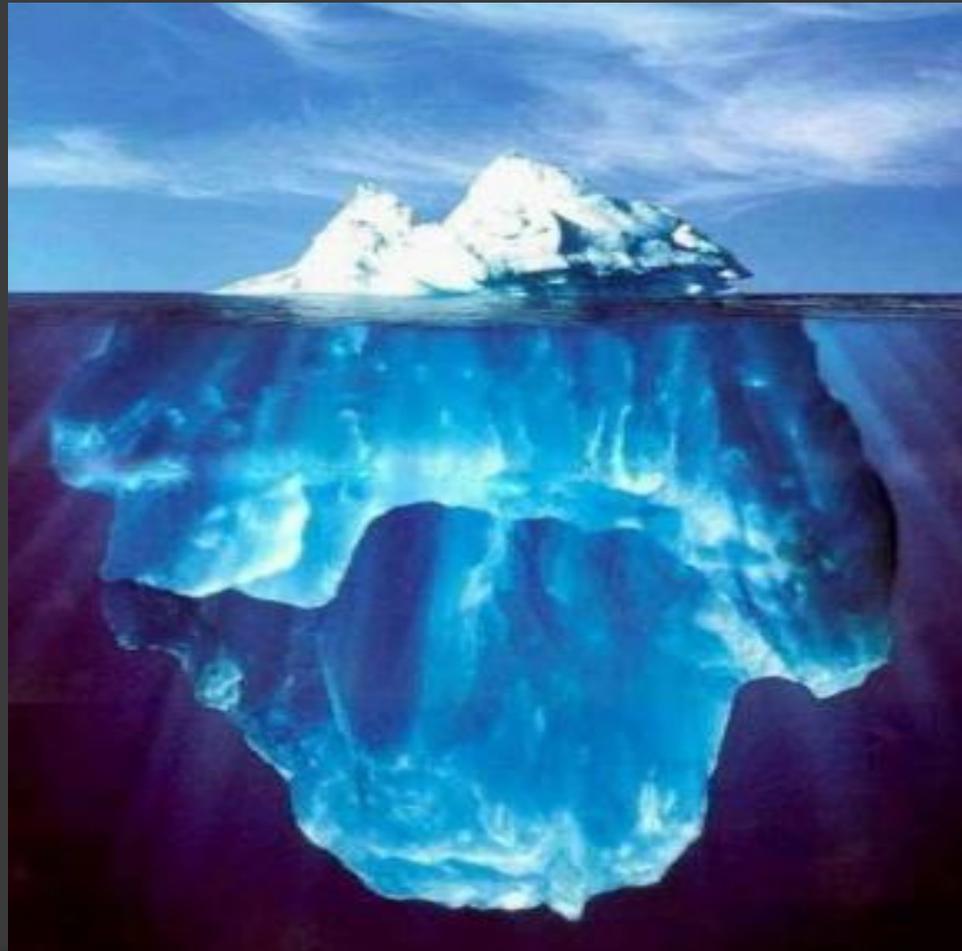
## ◎ Ask Questions

- So, what happened?
- Keep the “hinky meter” plugged in.

## ◎ Documentation

- Answers in quotation marks
- Photographs

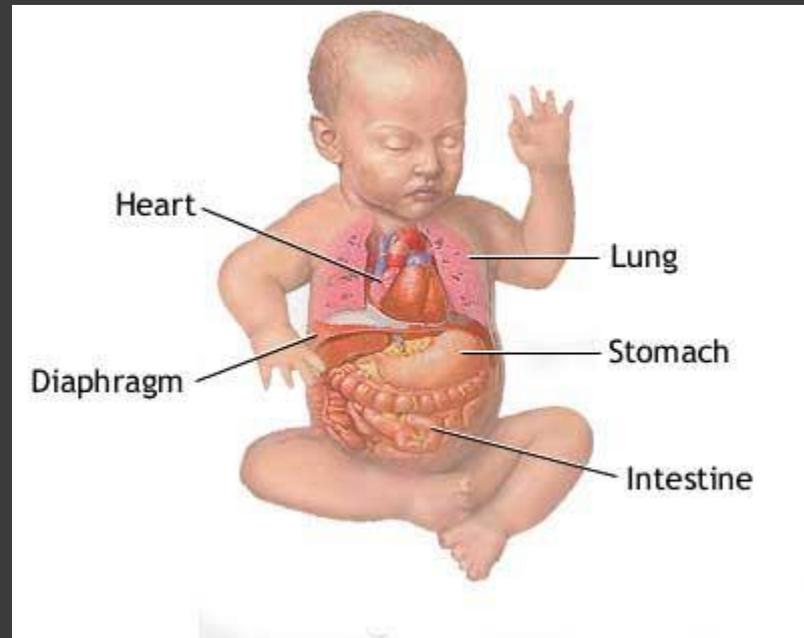
# Clinical Approach to Pediatric Trauma



# Physical Abuse; be afraid of what you can't see

- Fractures
  - Skeletal Surveys
  - All children under 2yo in whom there is a suspicion of physical abuse
- Intracranial Injuries
  - CT, MRI
- Abdominal Visceral Injuries
  - Ultrasound
  - Abdominal CT

# Clinical Approach to Pediatric Trauma



# Clinical Approach to Pediatric Trauma



Bruising in Infants and Children

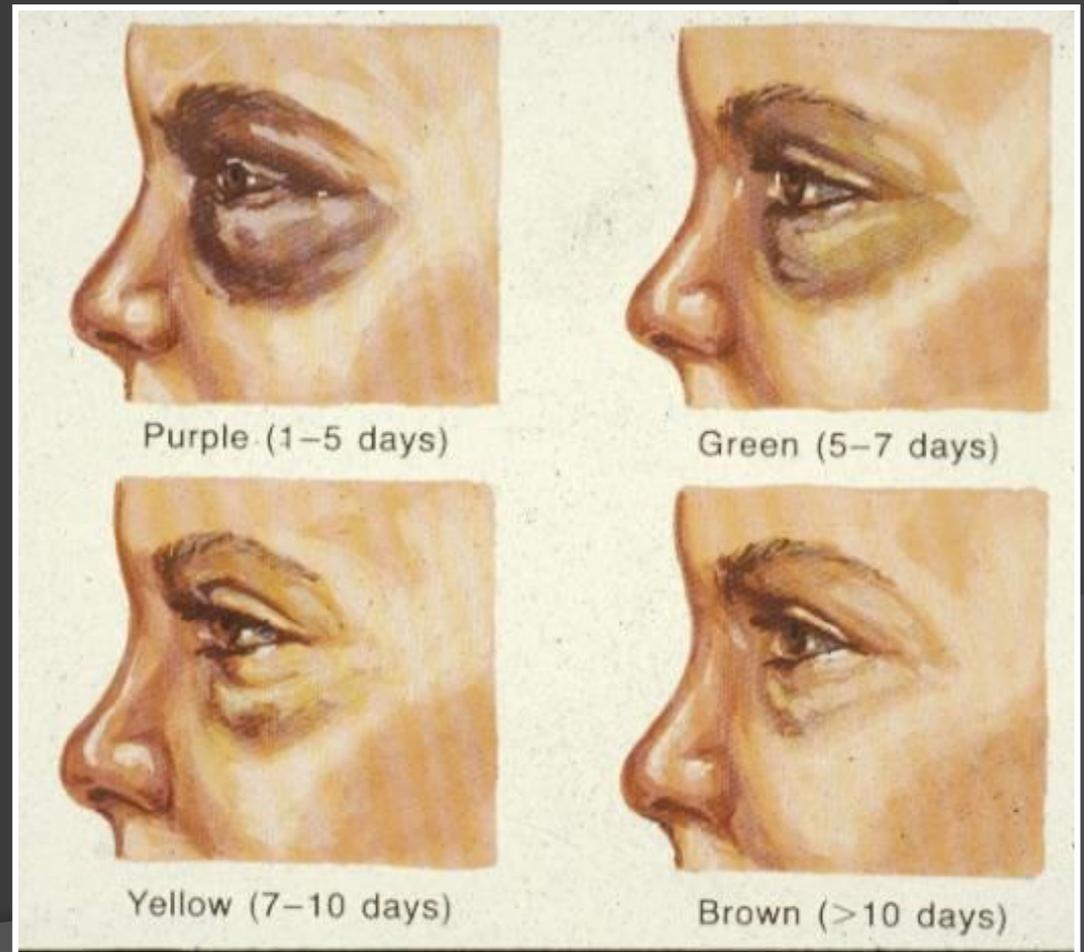
# Physical Abuse Injuries

# Bruising in Infants and Children

- Age of child
- Location
- Pattern bruises

# Dating Bruises

- You can't
- Dating “charts”  
not based on  
good science



# Bruising As a Motor Skill

- ③ 3 months - beached whale
- ④ 4 months - rolling over
- ⑥ 6 months - sitting up
- ⑧ 8-9 months - crawling
- ⑨ 9-12 months - cruising
- ⑩ > 12 months - crashing and burning

- Example case: 6 week old infant with bruising of chest and abdomen



# Bruising in Infant



- 11 week old infant with flank bruising- chest “popped” when held
- Fingertip bruising from forceful grasping

# Plantar foot bruising

- 6 week old infant evaluated for bilateral plantar bruising



# Plantar bruising



# Birthmarks vs Bruising

- ◎ Slate Gray Spots
  - Very common in African American, Asian, and Hispanic Infants
  - Present at birth

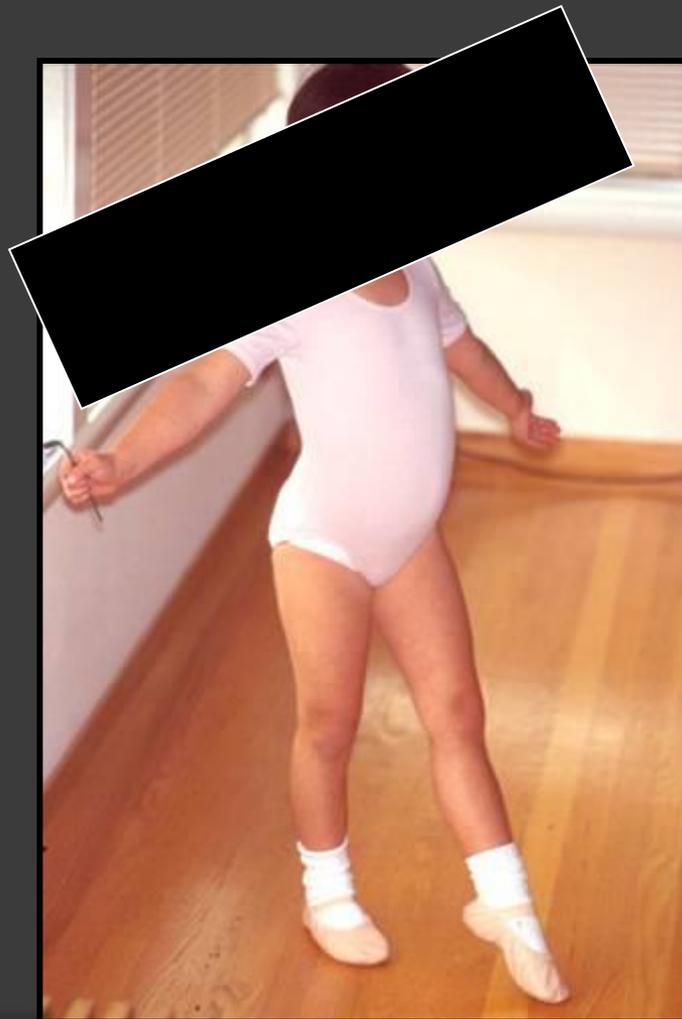


# Bruising in Ambulatory Children

- Location of Bruises

<b>Accidental</b>	<b>Abusive</b>
Shins	Upper Thighs
Hips	Trunk
Lower Arms	Upper Arms
Spinal Prominences	Sides of Face
Forehead, chin	Ears, buttocks, genitalia

# Bruising and Child Abuse



- Positive leotard sign

# Bruising and Child Abuse

- Accidental shin bruising



# Unique Challenges of Pediatric Trauma

- Big Headed People



# Periorbital Bruising

- Periorbital bruising



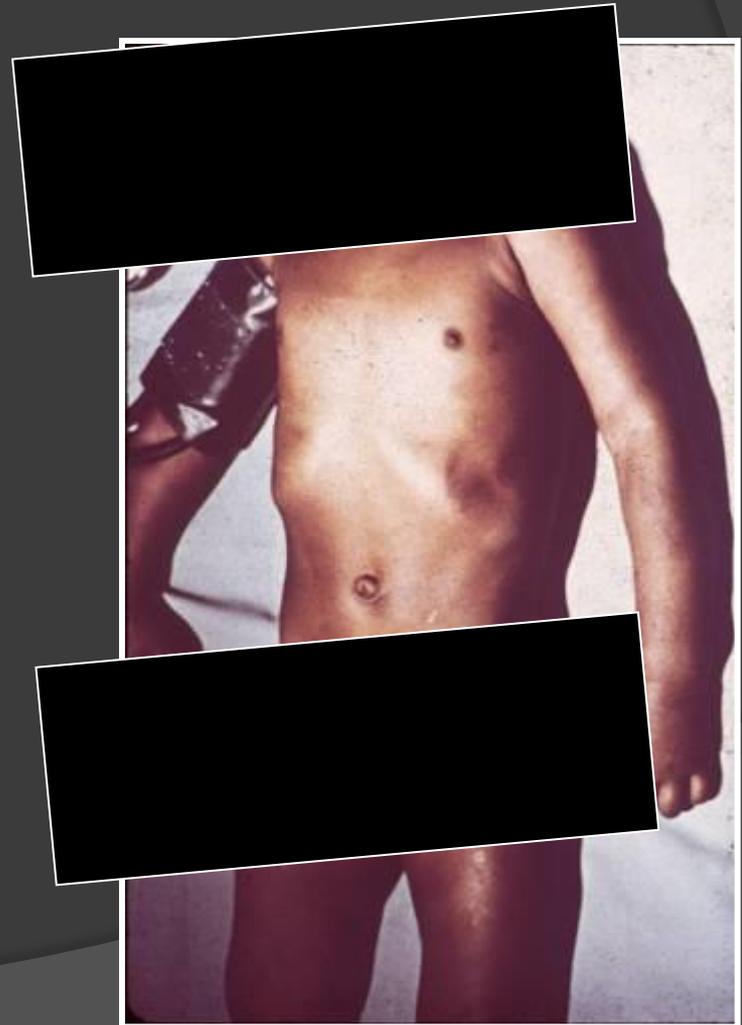
# Bruising in Children

- 2yo child with bruising



# Bruising and Child Abuse

- ◎ Abusive bruising
  - Truncal bruising in fatal cases



# 15 month old child with abdominal bruising

Abdominal CT scan showing complex liver injury



# Impact Trauma

- Earlobe bruising



# Facial Bruising



- 6 month old child brought to ED for scalp swelling after allegedly falling from bed.

# Facial/Earlobe Bruising



- ① 6 month old brought to ED for scalp swelling; family stated infant fell out of bed.

# Facial/Earlobe Bruising



- ① 6 month old infant brought to ED for scalp swelling. Family states infant fell out of bed.

Pattern Injuries and Physical Abuse

# Physical Abuse Injuries

# Injuries Caused by the Human Hand

- Wraparound injuries



# Injuries Caused by the Human Hand

- Slap marks



# Injuries Caused by the Human Hand

- Grasp marks



# Spanking Injuries

- Linear buttock bruising.



# Pattern Injuries



- Shape of injury explains mechanism

# Pattern Bruising



# Periorbital Bruising



# Periorbital Bruising



# Periorbital bruising



- ① 6 year old female with periorbital bruising and alopecia- CT shows diffuse scalp swelling



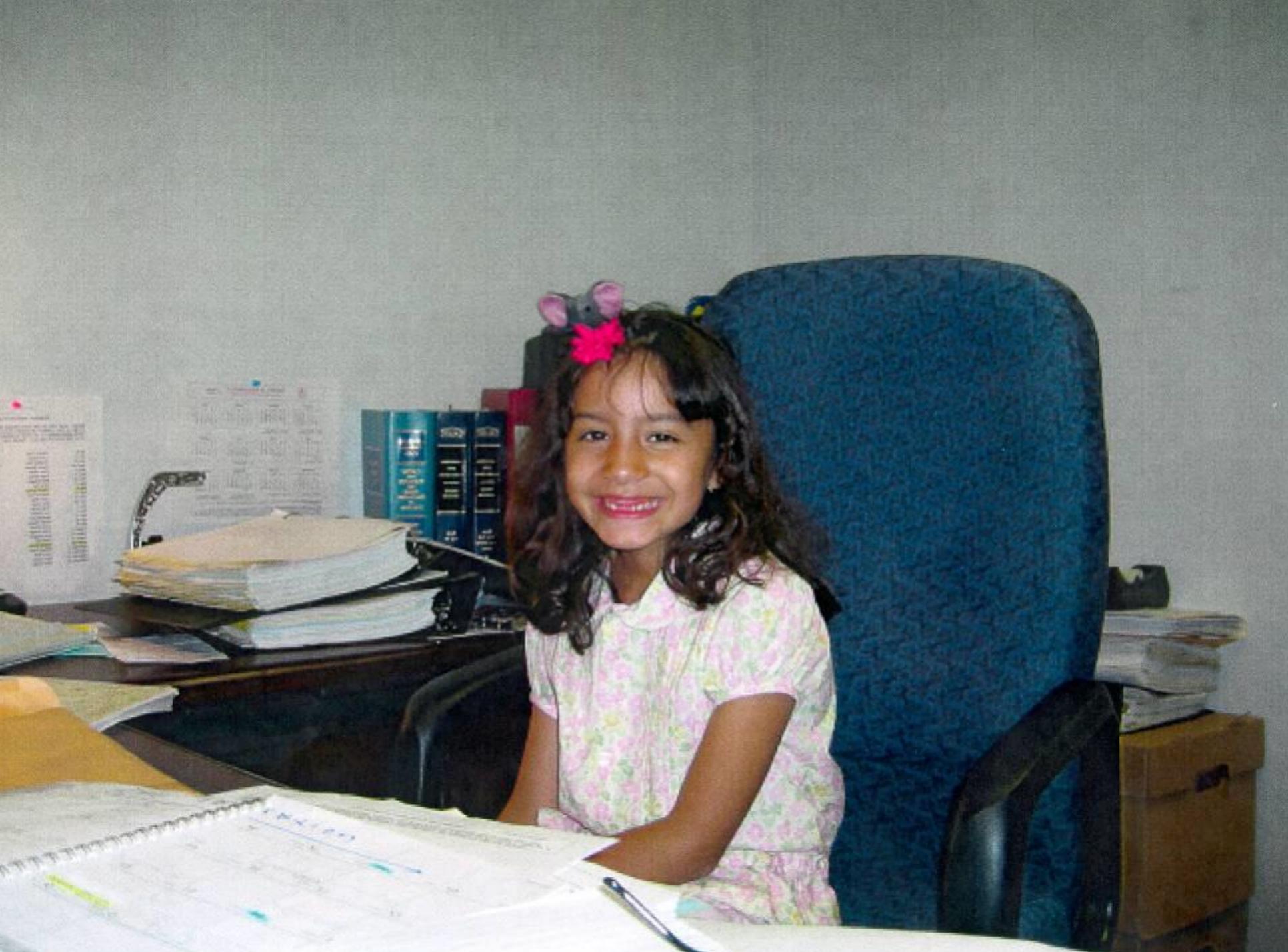
# Periorbital Bruising/Pattern Injuries



# Periorbital Bruising and Pattern Injuries

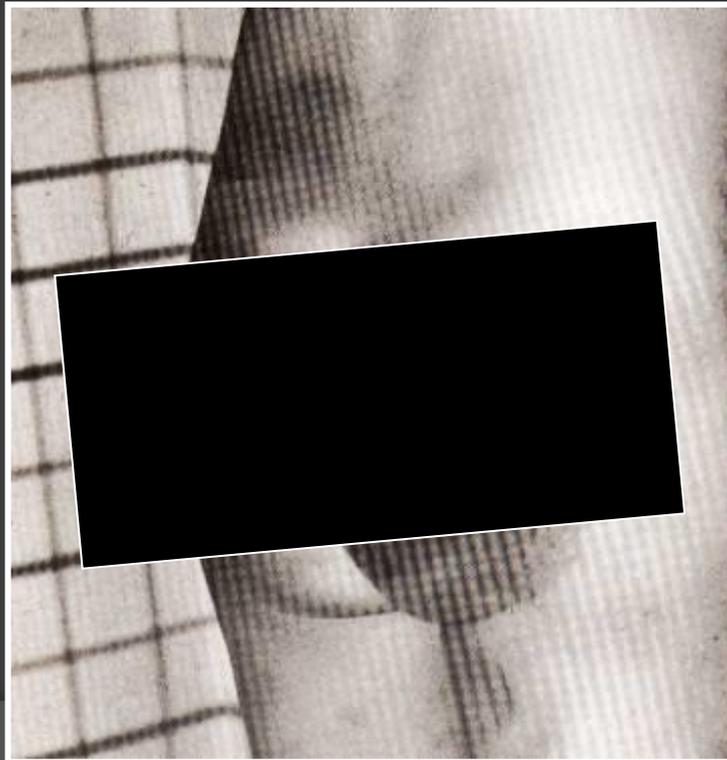
- 6 year old female with periorbital bruising and pattern injury to knees

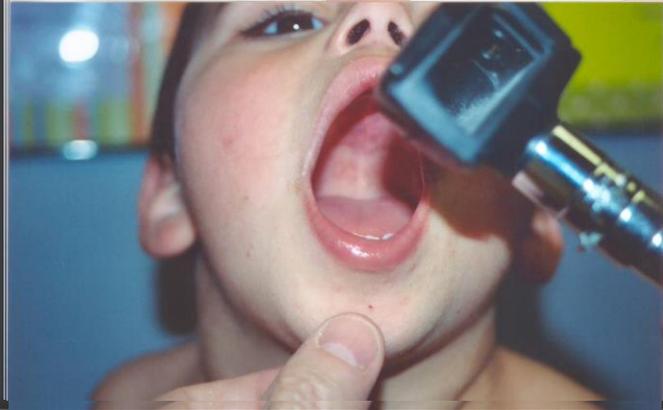




# Bruising and Abuse

- ⦿ Bruising that can mimic abuse (cont)
  - Diseases that interfere with normal blood clotting





# Bruising and Abuse

- Bruising that can mimic abuse
  - Coining, cupping



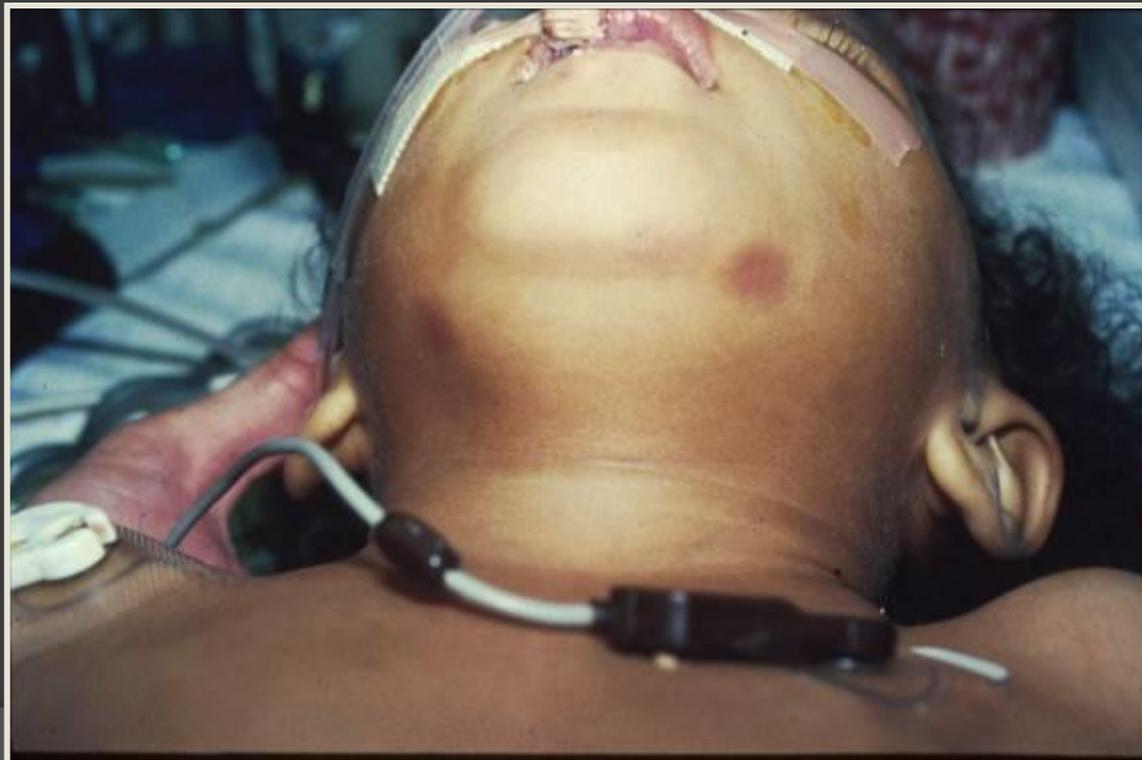
# Bruising and Abuse

- ⦿ Bruising that can mimic abuse (cont)
  - Increased pigmentation skin



# Bruising and Abuse

- ⦿ Bruising that can mimic abuse (cont)
  - Injuries caused by medical care



# Abusive Burns in Children



- 3 year old male - both hands immersed in hot water by Mother as punishment

# Burns From Hot Objects

- Abusive cigarette burn



# Burns From Hot Objects

- Moxibustion



# Burns from hot objects

- Moxibustion



Taken by Rosemary Smit -MSW  
4/18/02  
OHHS-CPS

# Conditions That Can Mimic Abuse

- Perianal chemical burn after ex-lax ingestion



Skeletal Injuries

# Physical Abuse Injuries

# Low Specificity Fractures

- ◎ The Clinical Conundrum: Fractures common in both abusive and accidental trauma
  - Femur fractures
  - Tibia/fibula fractures
  - Radius/Ulna fractures
  - Skull fractures

# Femur Fractures

- 2 month old infant brought to ED refusing to move left leg.



# Skeletal Surveys

- ⦿ Children under 2 yo with injuries suspicious for physical abuse
- ⦿ Children 2-5 yo with serious child abuse injuries
- ⦿ Not indicated for children > 5yo
- ⦿ Repeat skeletal surveys in 2 weeks
- ⦿ Uncertain areas
  - Severe neglect
  - Intoxication with drugs of abuse (eg, methamphetamine)

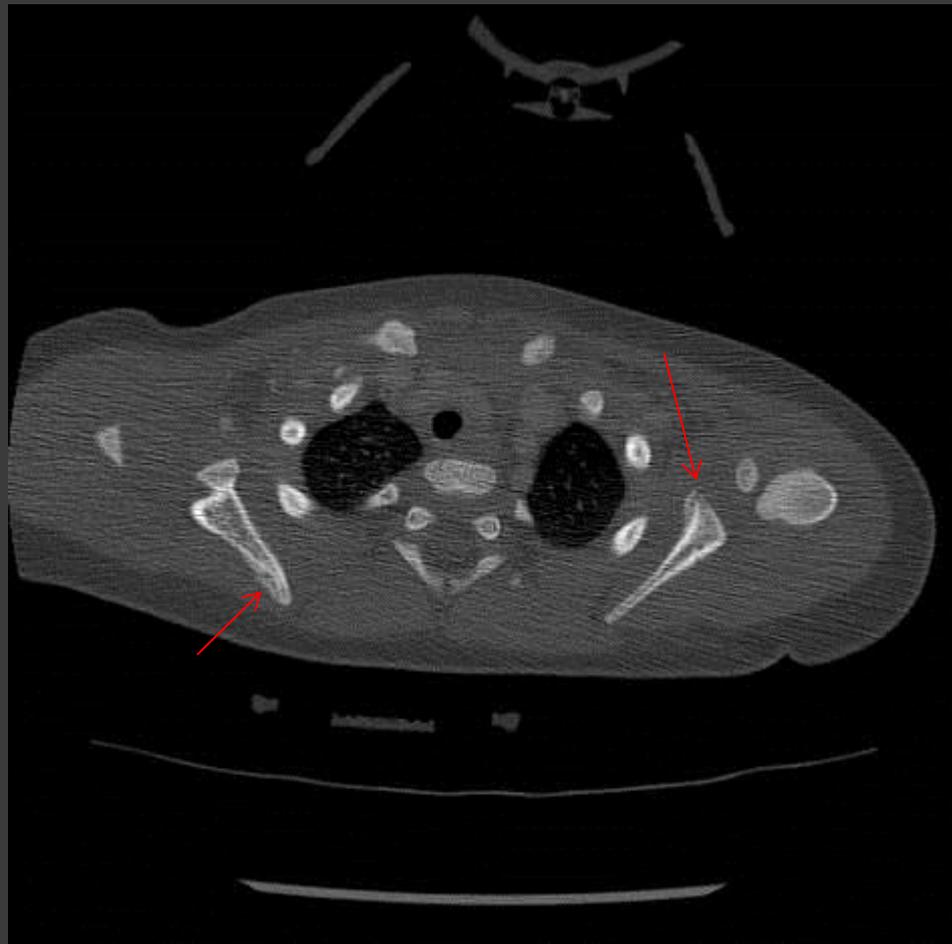
# High Specificity Fractures for Abuse

- Classic Metaphyseal Lesions
- Rib Fractures
- Scapular Fractures
- Sternal and Pelvic Fractures
- Hand and Foot Fractures in infants

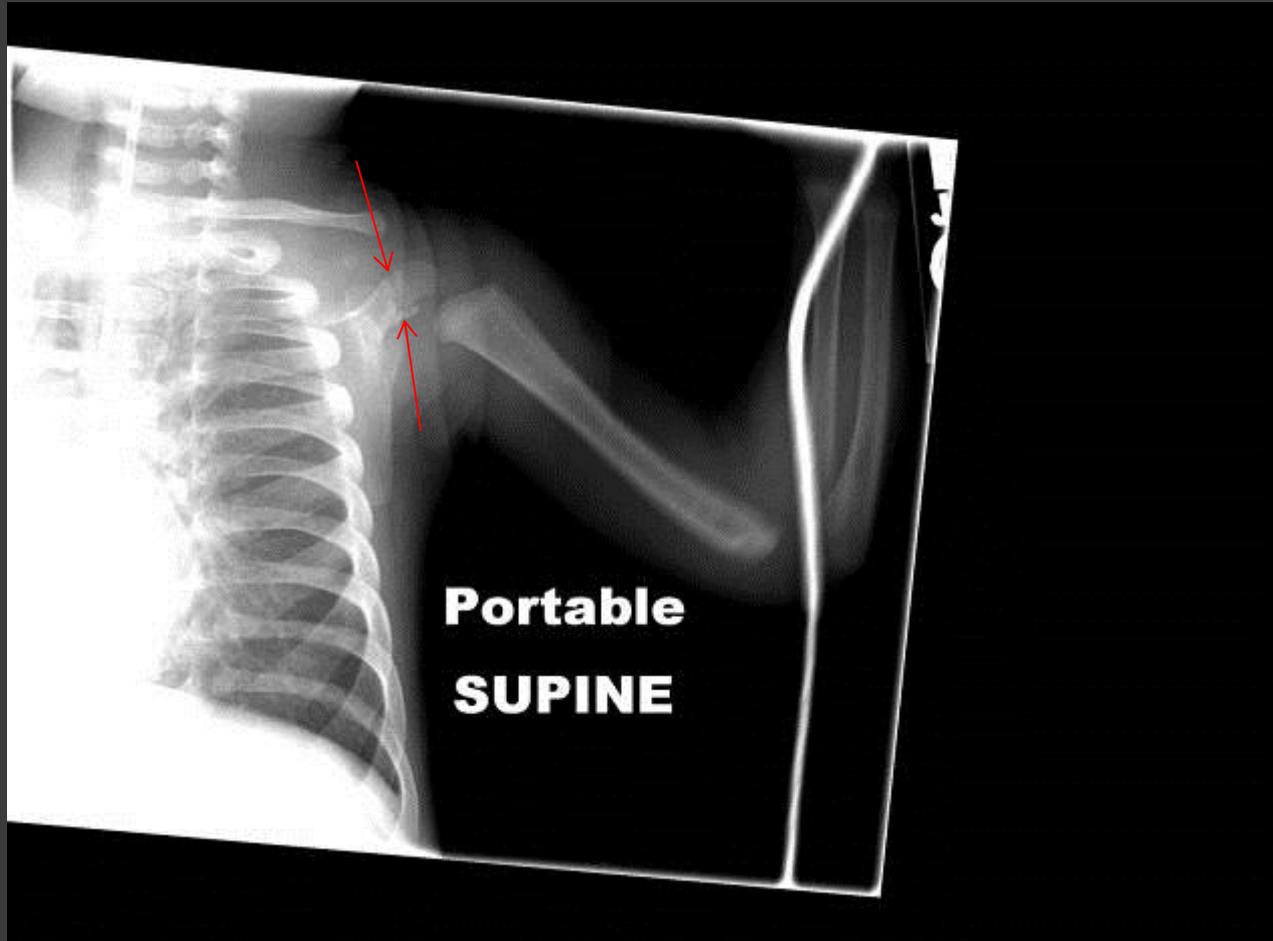
# Classic Metaphyseal Lesion



# Scapular Fractures



# Acromial Fractures



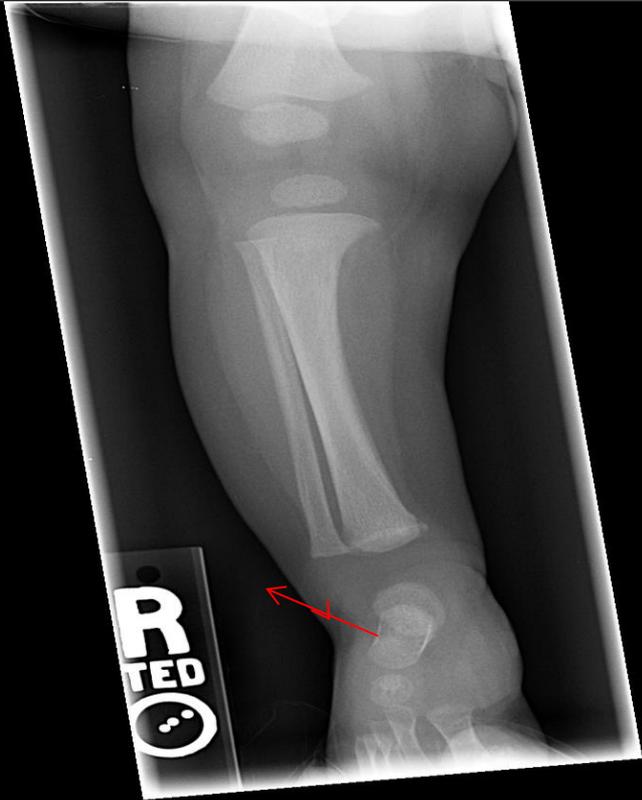
# Rib Fractures in Children

- 5 month old infant



# 2 month old with left femur fracture





## Femur Fractures



- Largest bone in the body
- Often thought that “high energy forces” required to cause a fracture

# Exersaucer related skeletal injury



## Fracture Associated with Exersaucer



Grant, P. et al. Pediatrics 2001;108:1009-1011

**PEDIATRICS**<sup>®</sup>

## Transverse Metadiaphyseal Femur Fracture in Young Infant



4 month old infant in bouncy seat on bed; bouncy seat with infant falls forward off bed. Infant found to have bruise on left kneecap



## Transverse Metadiaphyseal Femur Fracture in Young Infant

4 month old infant in bouncy seat; bouncy seat with infant falls forward off bed. Infant found to have bruise on left kneecap.

# Toddler's Fracture

- Usually a subtle, spiral or oblique non-displaced fracture of the mid or distal tibia.
- Can occur from seemingly innocuous trauma
- May have a history of a limp with no witnessed trauma
- NOTE: you have to be toddling to have a “toddler’s” fracture.

# Toddler's Fracture



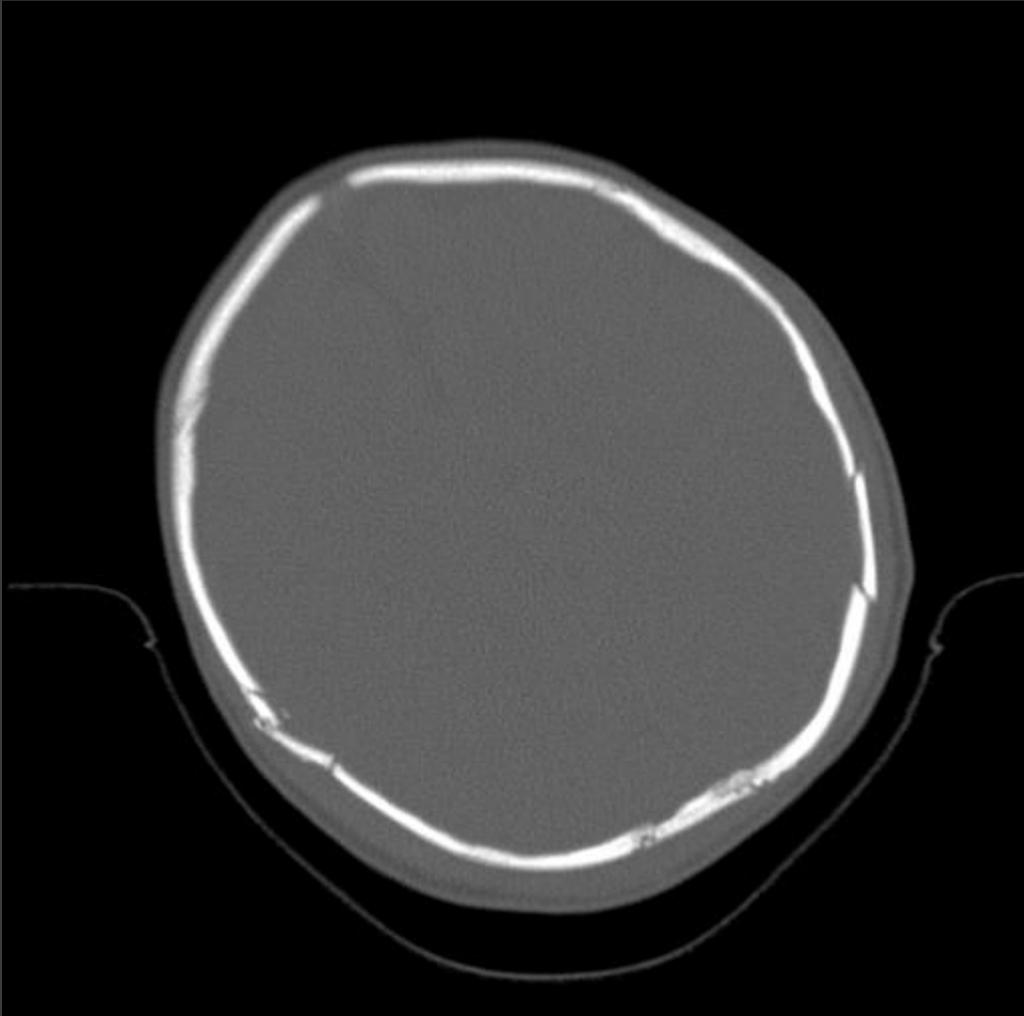


## ?Toddler's Fracture



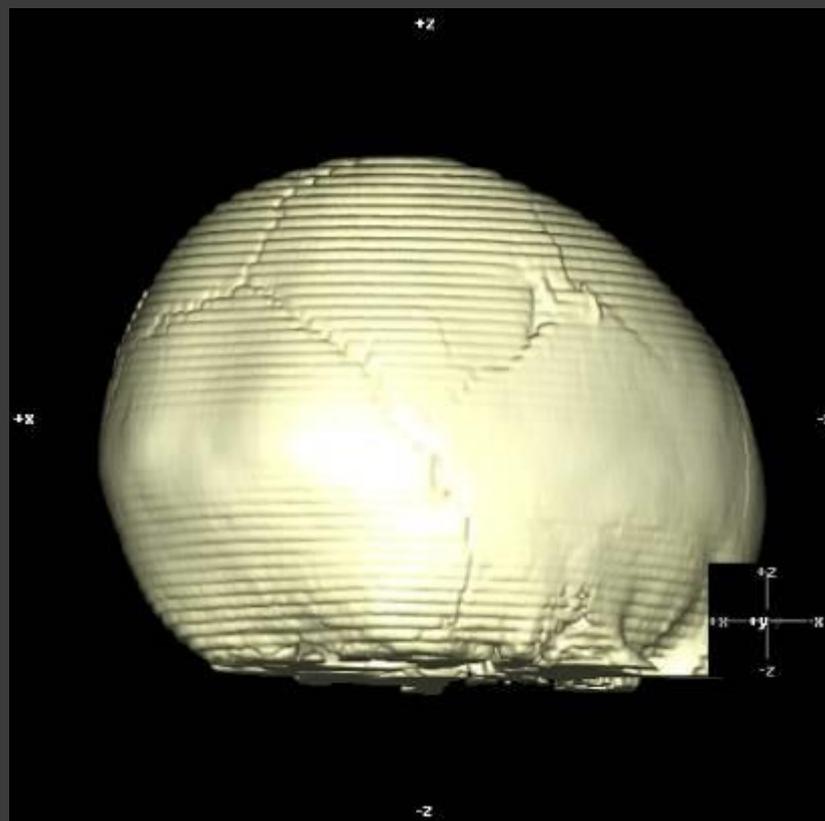
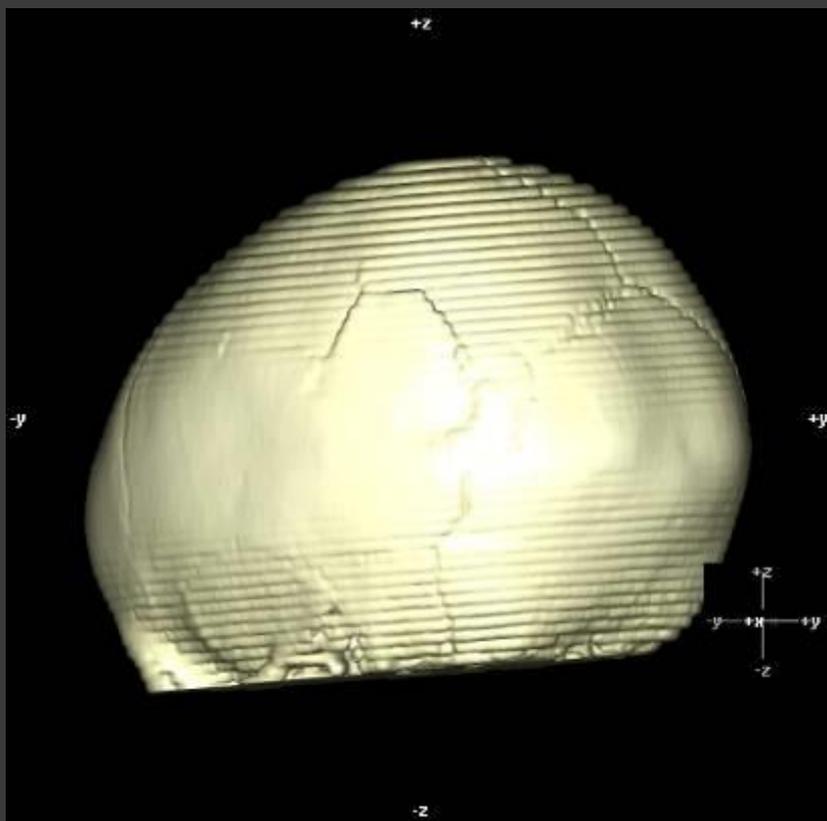
9 month old cruiser presents with 2 weeks of reluctance to bear weight on left leg. Prior xray of leg 1 week ago reportedly normal.

## ? Toddler's Fracture



He returns to ED 2 weeks later with sudden onset of lethargy

# ? Toddler's Fracture



## Spiral Femur Fracture



3 yo boy fell while rough housing with brothers

## Spiral Femur Fractures



2 yo child stepped on a toy, slipped and fell; Immediately cried and could not walk.

Abusive Head Injuries

# Physical Abuse Injuries



# What do we call it?

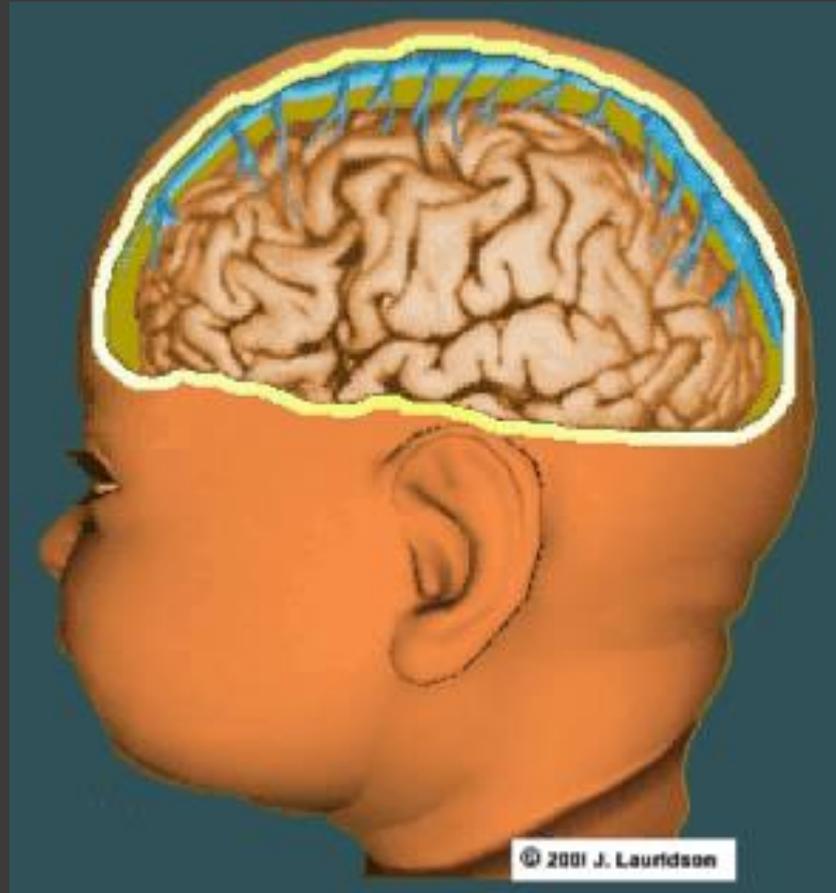
- Shaken Whiplash Syndrome
- Shaken Baby Syndrome
- Shaken Impact Syndrome
- Abusive Head Trauma
- Inflicted Traumatic Brain Injury
- Inflicted Neurotrauma

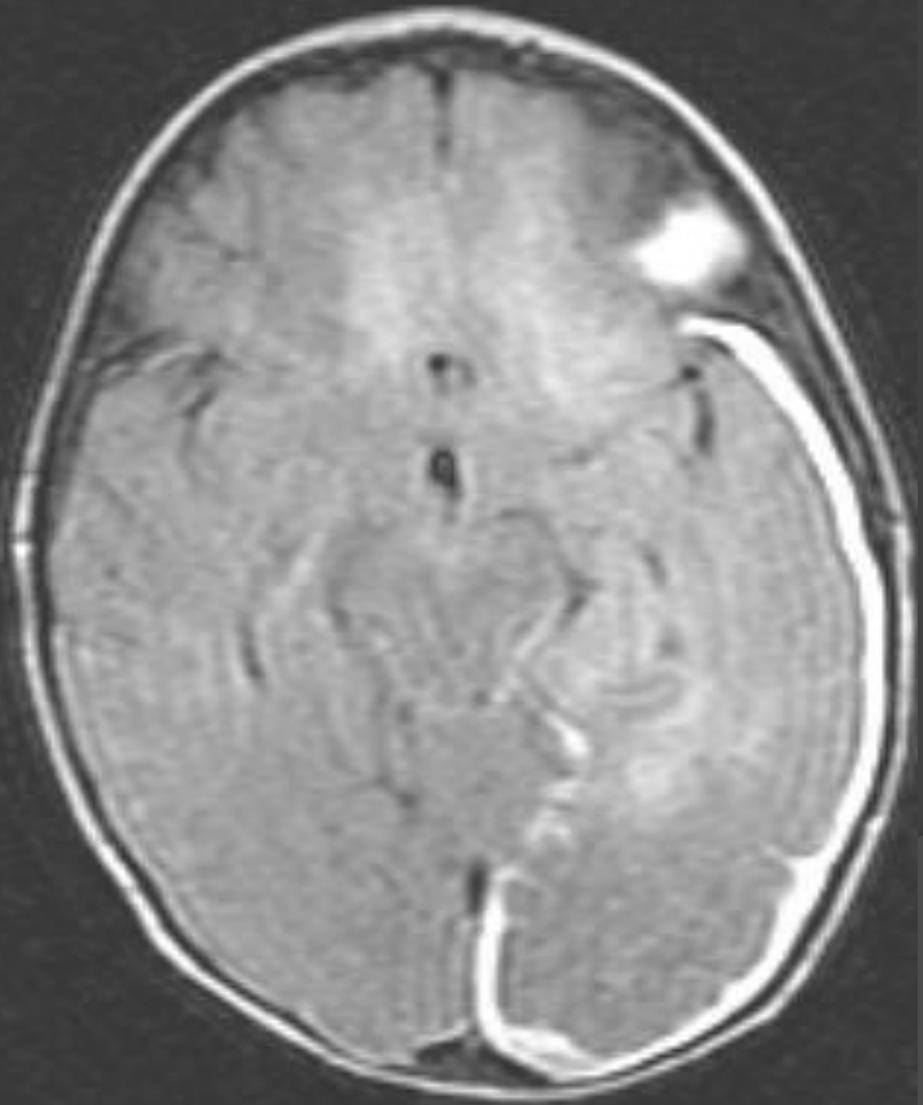
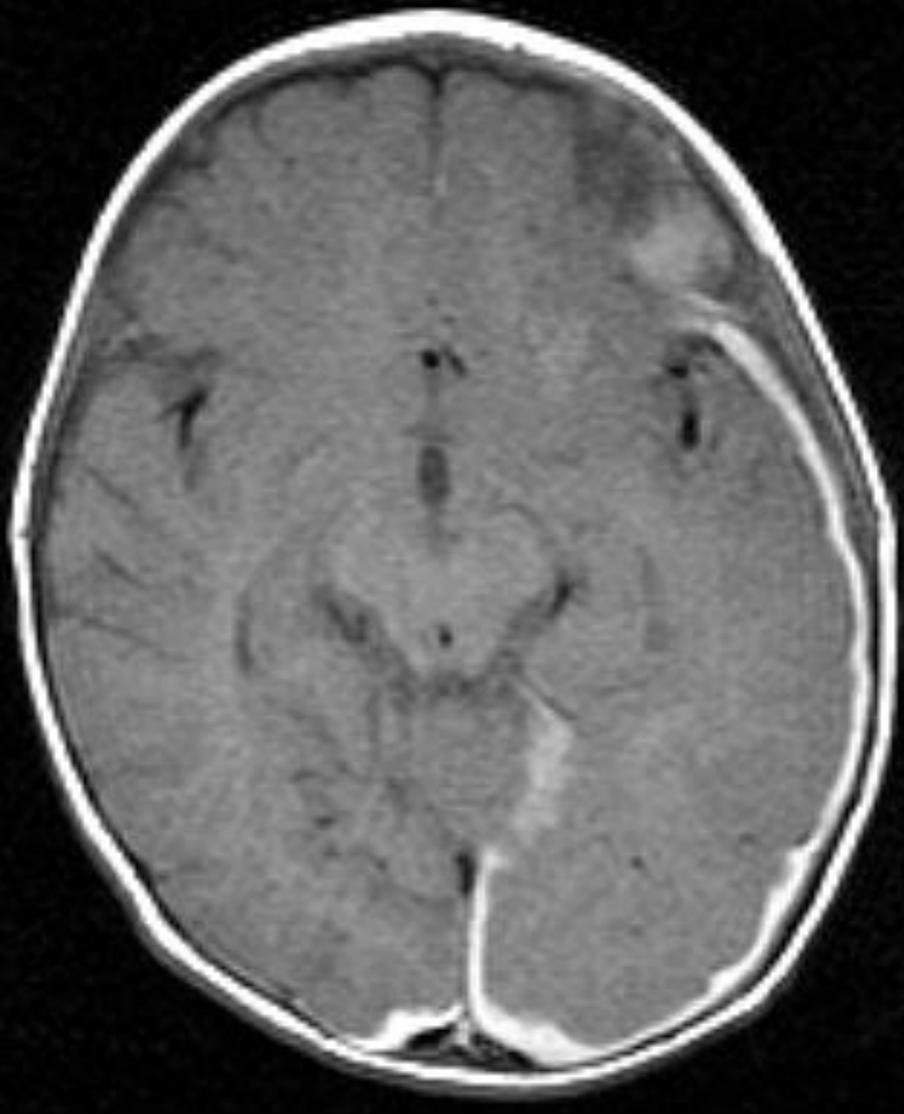
# Clinical Presentation

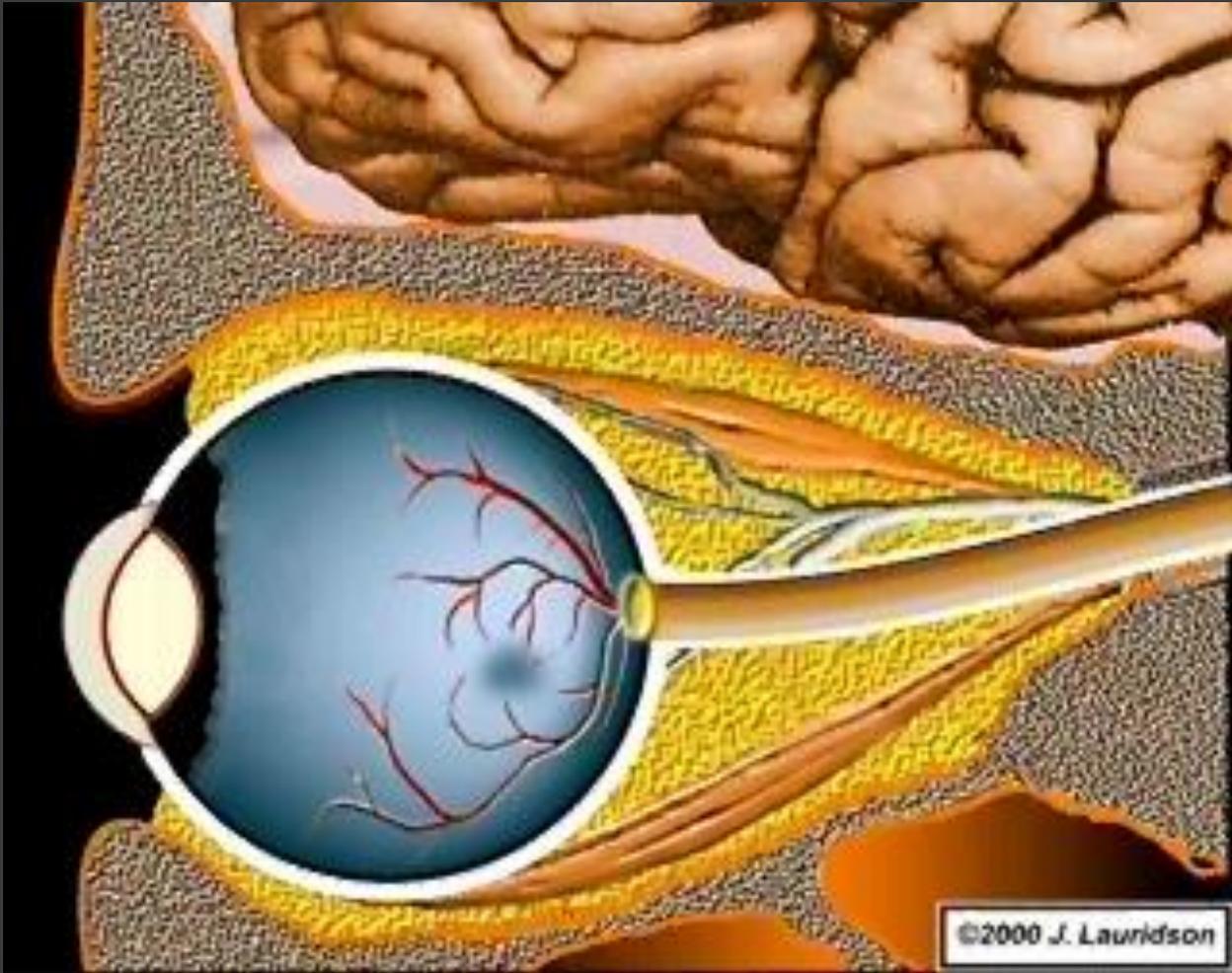
- Variable, depending on amount of brain damage
  - Irritability, lethargy, limpness
  - Seizures (40%–70%)
  - Feeding difficulty, vomiting
  - Hypoventilation, hypothermia, bradycardia
  - Coma, decreased responsiveness, death

# Clinical Presentation

- More subtle presentations include vomiting, general irritability, developmental delay, increasing head circumference.
- Jenny C, Hymel KP, Ritzen A, Reinert SE, Hay TC. Analysis of missed cases of abusive head trauma. *JAMA*. 1999;281:621–626
  - 1/3 of 173 patients with head injuries had been seen by physician after AHT and the diagnosis was not recognized.
  - AHT was more likely to be unrecognized in very young white children from intact families and in children without respiratory compromise or seizures.



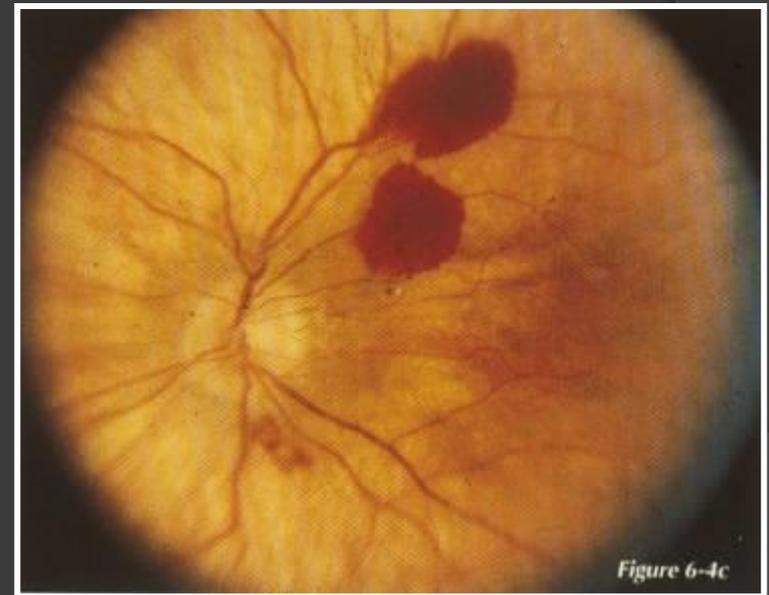
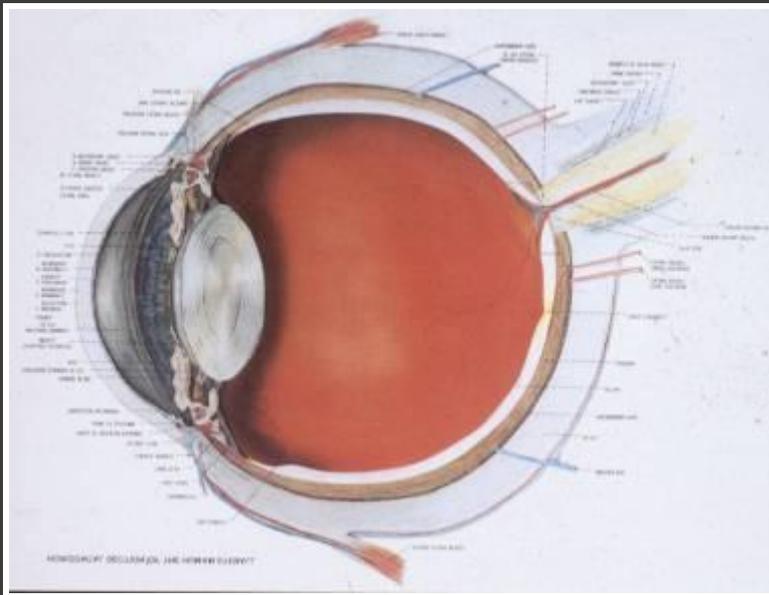


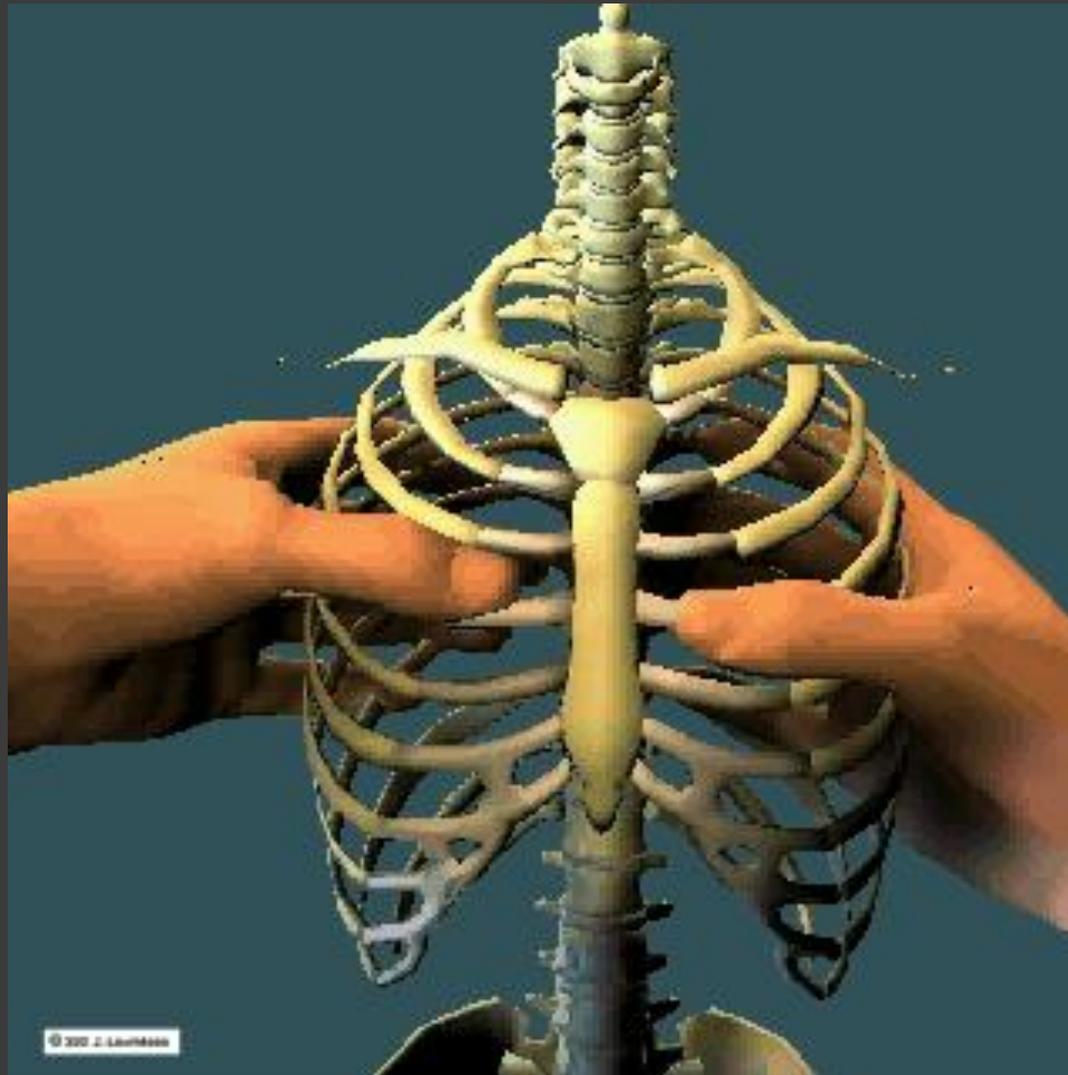


©2000 J. Lauridson

# Abusive Head Trauma

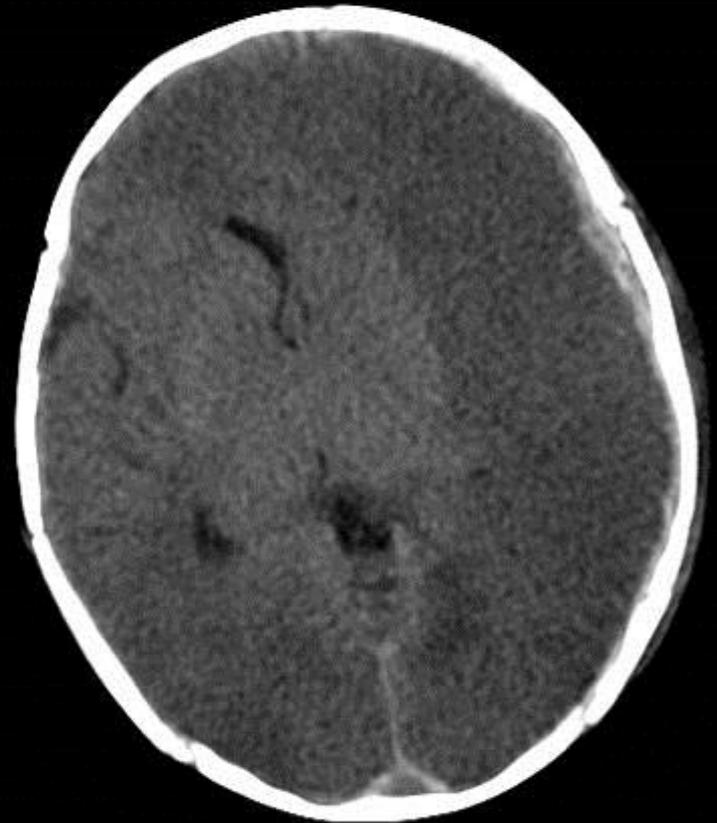
## Retinal Hemorrhages (RH)





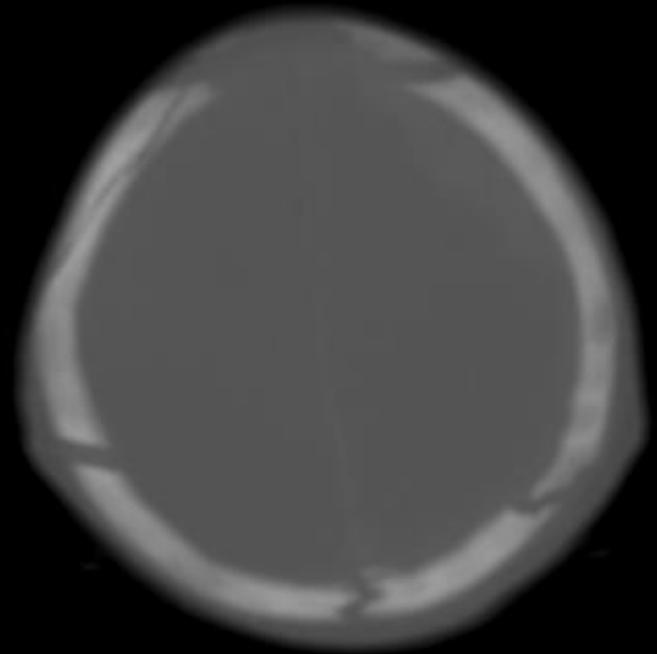
# Head Trauma

- 2 ½ month old infant taken to pediatrician by Mother because was lethargic. Seized in pediatrician's office



# Head Trauma

- CT scan of head showed multiple skull fractures



# Head Trauma

- CT scan of chest showed multiple rib fractures



# Head Trauma

- The infant had seizures that were difficult to control and signs of increasing intracranial pressure.
- She was taken to OR for a decompression craniectomy
- There was no explanation for the injuries

# Head Trauma

- She remained in the hospital for 6 weeks
- One year later (now 14 months old), she cannot sit, visually focus or follow, babble, or grasp with her right hand.
- She has daily seizures.

# Head Trauma

- Head CT scan 10 months after the injury



# Case Presentation

- Paramedics respond to a 911 call
- A mother reports that one of her 7 week old twin infants is “twitching”
- On arrival, Mother can’t remember which twin twitched
- The infants appeared stable
- Mother was instructed to take the twins to her “regular doctor”.

# Case Presentation

- After the paramedics left, one of the infants began twitching again.
- Mother drove the infant to the ED.
- In the ED, the infant had a generalized seizure.
- After stabilization, the infant had diagnostic studies performed

# Case Presentation

- Mother stated the infant was previously well; delivered vaginally at 37 weeks gestation
- No history of trauma or significant illness
- No cutaneous injuries on examination

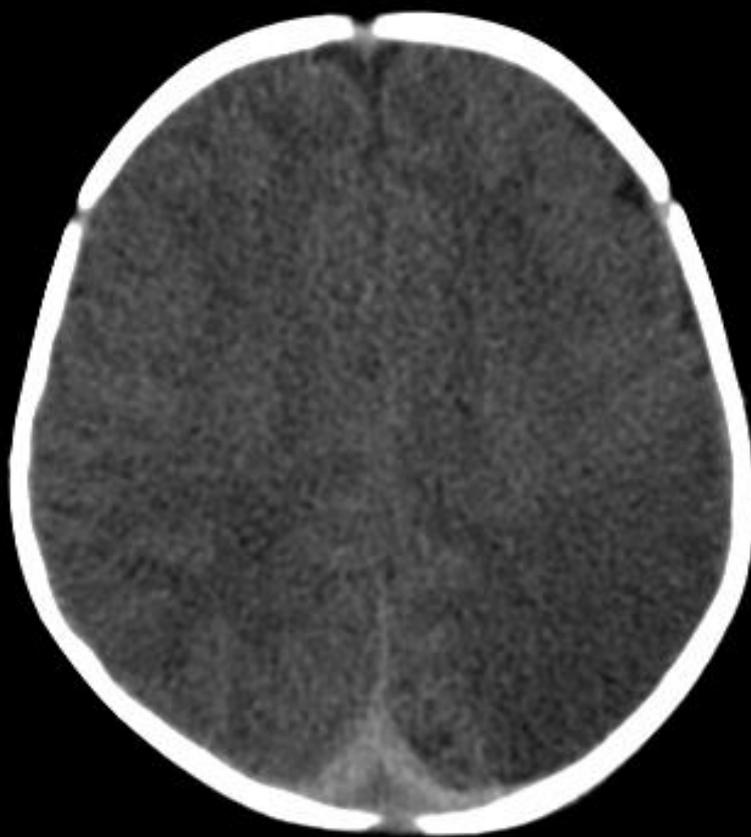
# Case Presentation

- ◎ Further evaluation discloses:
  - Bilateral retinal hemorrhages involving multiple layers out to the ora serrata
  - Vitreous blood
  - Skeletal survey demonstrated a linear skull fracture
  - Coagulation studies, LFT's, amylase normal

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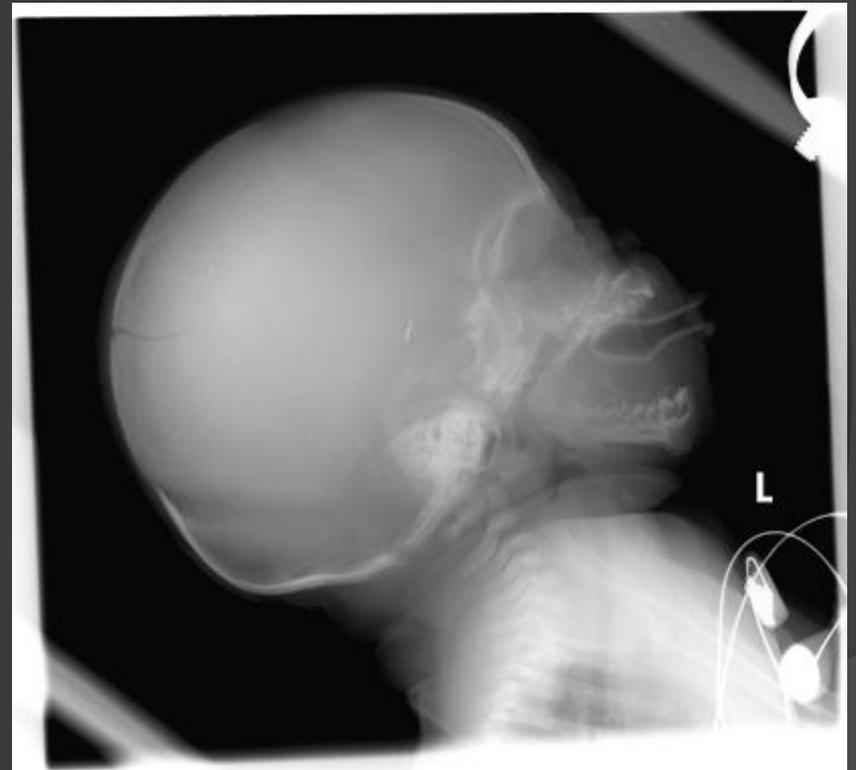
# Head Injury: Abuse or Accident?

- 11 month old female presents with seizures and rapidly worsening mental status
- CT scan initially read as acute and chronic subdural hematomas

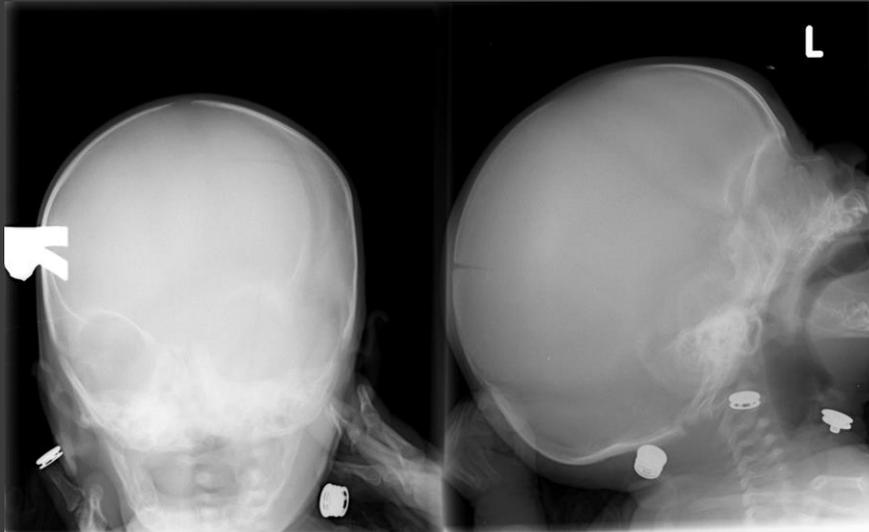


# Case Presentation

- 38 day old infant with focal seizures
- Parieto-Occipital skull fracture

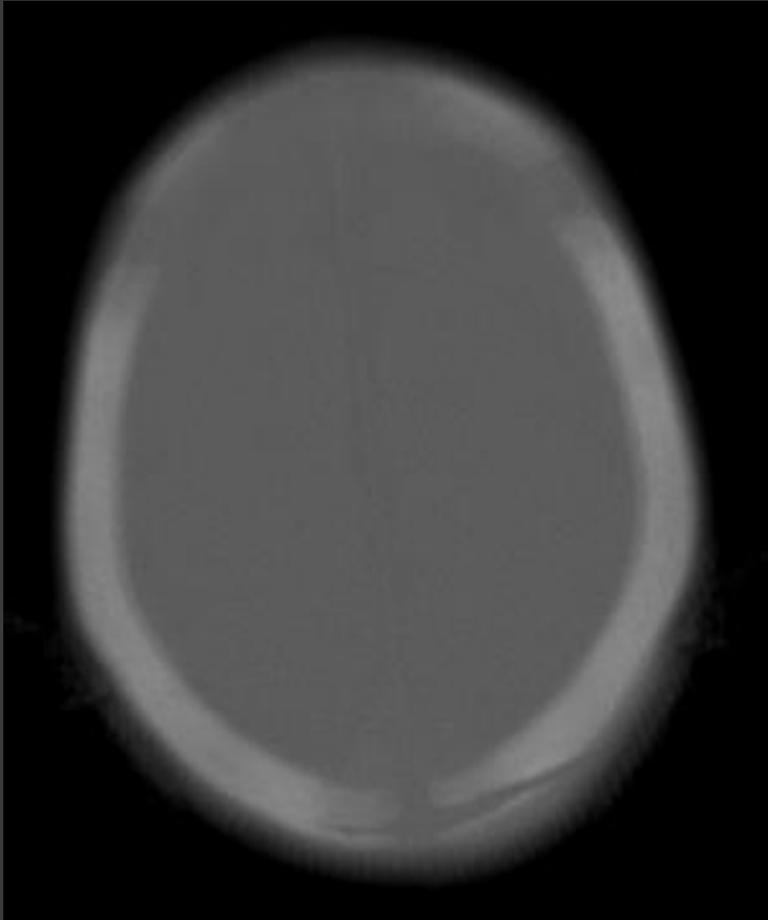


# Case 3



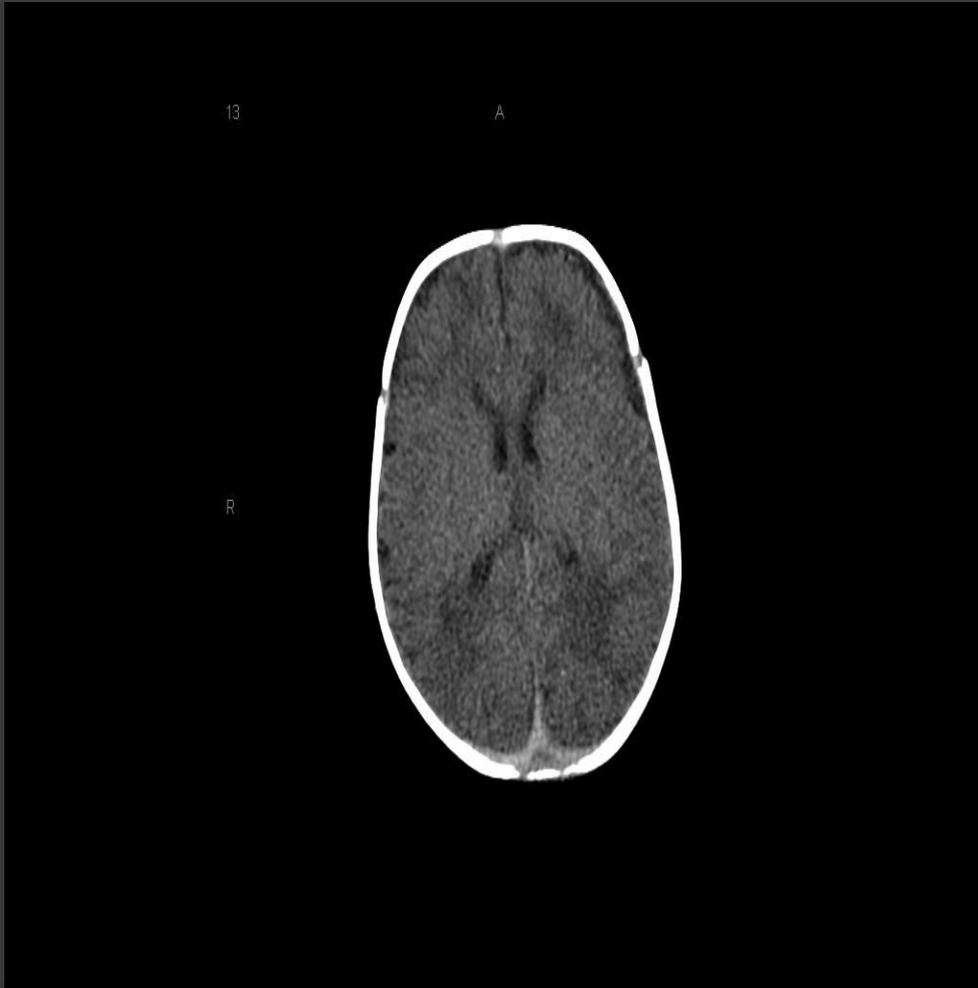
- Twin B
- Parieto-occipital skull fracture

# Case 3



● Twin B

# Case 3



- Twin B- asymptomatic
- Extensive retinal hemorrhages

# Head Injury: Abuse or Accident?

- Mother states infant was restrained in an infant seat that had been secured to a chair at the dinner table
- Infant put her feet up against the edge of the table and pushed backward, striking back of head against floor
- Initially cried; then became lethargic, unconscious, and seized within 15 minutes

# Head Injury: Abuse or Accident?

- Law enforcement scene investigation



# Head Injury: Child Abuse or Accident

- Skeletal Survey- no fractures
- Chest and Abdominal CAT scans- no additional organ injury
- No cutaneous bruising