

# Doctors in Dependency Cases

# Use of an “Expert”

- Definition
  - “Anyone who knows more than I do”
  - Artificial Intelligence
- There to provide information
- There to educate
- Not there to advocate

# Doctors

- Medical Education
  - Four years
  - US schools vs. non US schools
- Internship
  - Become licensed after passing Part 3 of Medical Board
- Residency
  - Variable length of training
    - Orthopedic Surgery 5 years
  - Fellowship – additional training

# Doctors

- Board certification
  - Not one national certifying board
  - American Board of Medical Specialties
- Continuing Medical Education
  - Re-certification
  - Maintenance of Certification

# Doctors in Dependency Cases

- What they are:
  - Interpreters of the medical facts
  - Trained Observers
  - Schooled in Science, not law
    - What “could” have happened, not what “more probably than not” did happen
  - Medical Opinion
    - Defined by the “basis” for that opinion
    - “Basis” means facts / observations / interpretation of data

# Doctors in Dependency Cases

- What they are ***Not***:
  - Triers of fact
  - Knowledgeable of legal terms
  - Able to take sides
    - Bias does not apply to data
  - Able to extend opinion beyond set of facts
  - Easy to deal with

# Utilizing Doctors in Dependency Cases

# How Doctors can Help

- Identify / describe patterns of injury
  - Fractures, burns, bruises, retinal hemorrhaging
- Assemble a Timeline of injuries
  - Need serial data points to be most specific
  - Did injuries occur at the same time
  - Using information from multiple sources
- Put history of injury into context
  - Could the injuries have occurred as described?
  - Pointing out what doesn't fit equally as important as corroborating history



# Putting Patterns into Context

- Child's age / weight
  - Pediatrician charts important
- Metabolic status
  - Catabolic vs. Anabolic state
- Congenital anomalies
  - Clavicle, tibia congenital non-unions
- Inheritable diseases
  - Osteogenesis Imperfecta
- Birth related issues
  - Small for gestational weight
  - Neonatal Rickets

# Collecting the Data

- Primary Survey
  - Collect data from first ER contact
  - Records, Lab, X-rays / Images, scans
  - Consultations
    - Ophthalmology
    - Neurology
    - Neurosurgery
    - Orthopedic Surgery
    - Hematology
    - Plastic Surgery (Burns)

# Collecting the Data

- Secondary Survey
  - Repeat Skeletal Survey at 2 weeks
  - MRI
  - Bone Scan
  - Operative Reports
  - Follow up consultations
    - OES 900 exams
      - Patient
      - Siblings

# What Helps / What Doesn't

- Helpful
  - Petition included
  - Scans on CD include all studies
    - Head CT – need bone “windows”
  - Expert Opinion reports
  - If less than 3 months old
    - Birth Records

# What Helps / What Doesn't

- Not as Useful
  - Police reports
  - Live Scans
  - Prior NAT reports / allegations
  - Social worker interviews with treating doctors
  - Sibling medical records

# Utilizing Experts

- Report the facts
  - Facts form basis of Opinions
    - Differentiate actual from possible
      - Secondary data key
- Establish Timelines of Injury
  - Clues to aging of injuries
    - Callus formation – long bones
    - Soft Tissue Swelling – skull fractures
    - Bruise patterns of healing
      - Purple to red to yellow / green

# Utilizing Experts

- Identifying patterns of injury
  - SDH, retinal hemorrhaging, MCFs, posterior rib fractures
- Explain Pathophysiology of Injuries
  - Spiral fracture
  - Transverse fracture
  - Oblique fracture
  - Tool marks
  - Burns
  - Bruise / hematoma / hemorrhage

# Utilizing Experts

- Interpreting Reports
  - What data was used for the basis of the opinion(s)
  - When was the report prepared
    - Pre-secondary survey
  - How was the data obtained
    - First hand vs. second hand
    - Did they actually review the films independent of another expert or not
    - Primary source verification



# Differentiating Experts

- Sub Specialty
  - Radiologist vs. Orthopedic Surgeon
- Experience / Education
- What was reviewed
  - Primary source verification
  - Reliance on records / consultations
- Verify with secondary survey

# Utilizing Experts

- Building a case
  - Series of opinions based upon interpretation of data sets
- Pre Trial Opinion letters
  - What was reviewed
  - Opinions
  - Basis for those opinions
- If left untreated
  - Disfigurement, Dysfunction, Deformity
  - Death

# Utilizing Experts

- Trial Testimony
  - Never a surprise
  - Explain opinions / basis for opinions
  - Never biased or judgmental
  - Never combative
  - Use props as necessary to make a point
    - Posterior rib fractures
  - Explaining x-rays / scans helpful to demonstrate depth of knowledge / understanding

# Common Myths and the Truth

# Myths

- Certain injuries are “classic” for non accidental trauma
  - Patterns can be characteristic of NAT
  - Individual injuries are rarely characteristic
- Need to understand “Classic” or “path gnomonic” signs of abuse

# “Classic” Fractures

## Non-Accidental Trauma

- Metaphyseal Corner Fractures
  - Distal femur / Proximal tibia
- Rib fractures
  - Bilateral, posterior paraspinal
  - Ribs 4 to 9 most common
  - 4 or greater “high risk” of death
- Spiral Fractures
  - Humerus / Femur
  - Distal part of spiral points to direction of twist
- Skull Fractures
  - Parietal most common
  - Epidural hematoma vas subdural hematoma

# “Classic” Fractures

## Non-Accidental Trauma

- Metaphyseal Corner Fractures
  - “Classic metaphyseal lesion”
  - End of the bone
    - Adjacent to the growth plate
- Described by PK Kleiman, MD 1986 article
- Significant debate about callus formation
  - Up to 1/3 – no callus







# “Classic” Fractures

## Non-Accidental Trauma

- Rib fractures
  - Posterior versus lateral
    - Squeeze versus direct trauma
    - Anterior posterior force versus lateral compression
    - Clavicles are protected
- May be very hard to see initially
  - Usually picked up in the healing phase
- 4 or more are associated with significant chance of death





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# “Classic” Fractures

## Non-Accidental Trauma

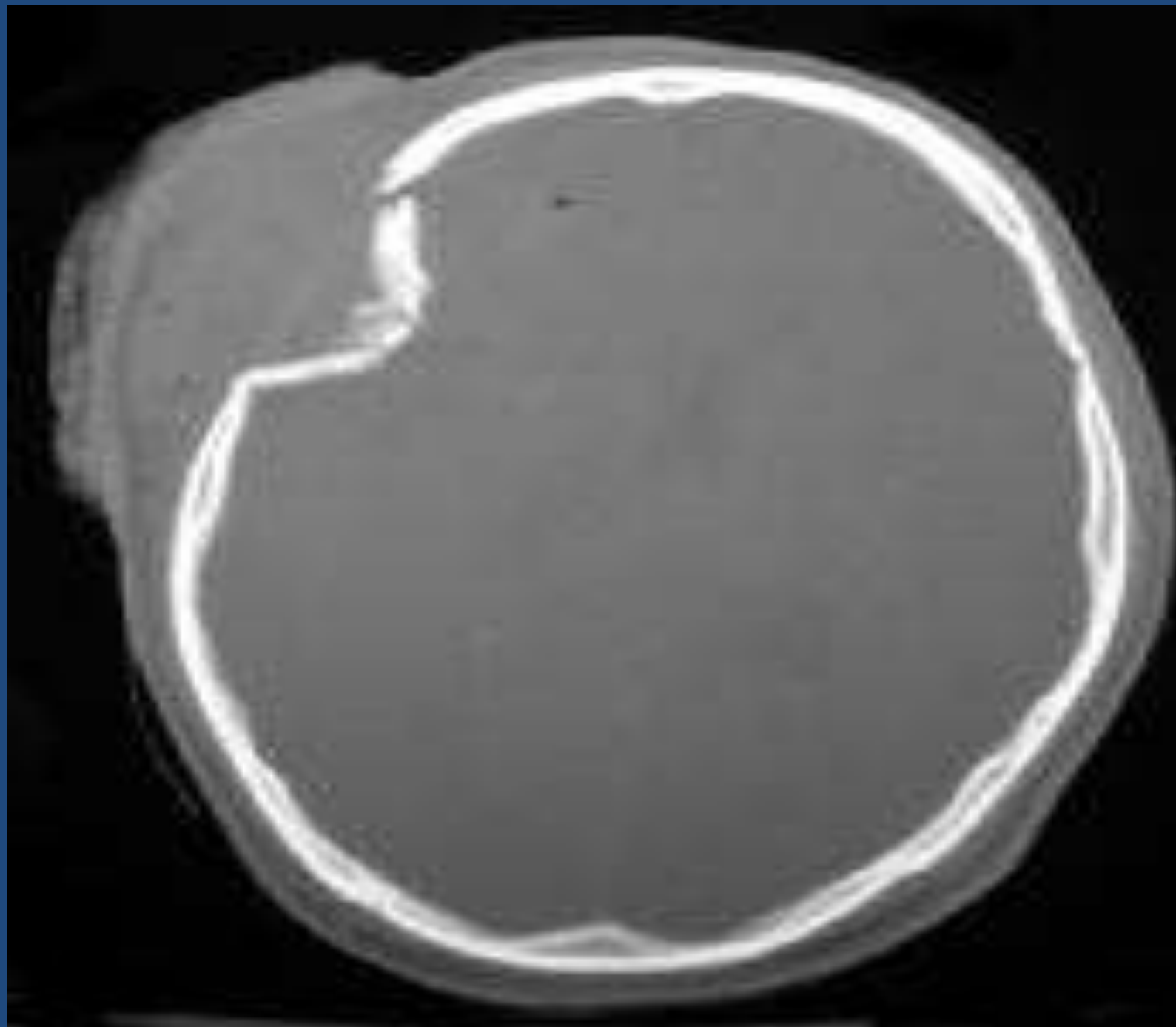
- Spiral fractures
  - Fracture morphology is related to how the force is applied
  - Transverse fractures are bending moments of force
  - Spiral fractures are rotational moments of force
- Oblique fractures are a combination of the two



# “Classic” Fractures

## Non-Accidental Trauma

- Skull fractures
  - Heaviest part of a baby
  - Parietal fracture is most common
  - “too many lines sign”
    - Have to differentiate from normal skull sutures
- Overlying hematoma is best way to date fracture
  - Galeal fascia (scalp) overlies the skull
  - Swelling maximal in 24 to 48 hours, gone in 5 to 7 days
  - Look for tool marks



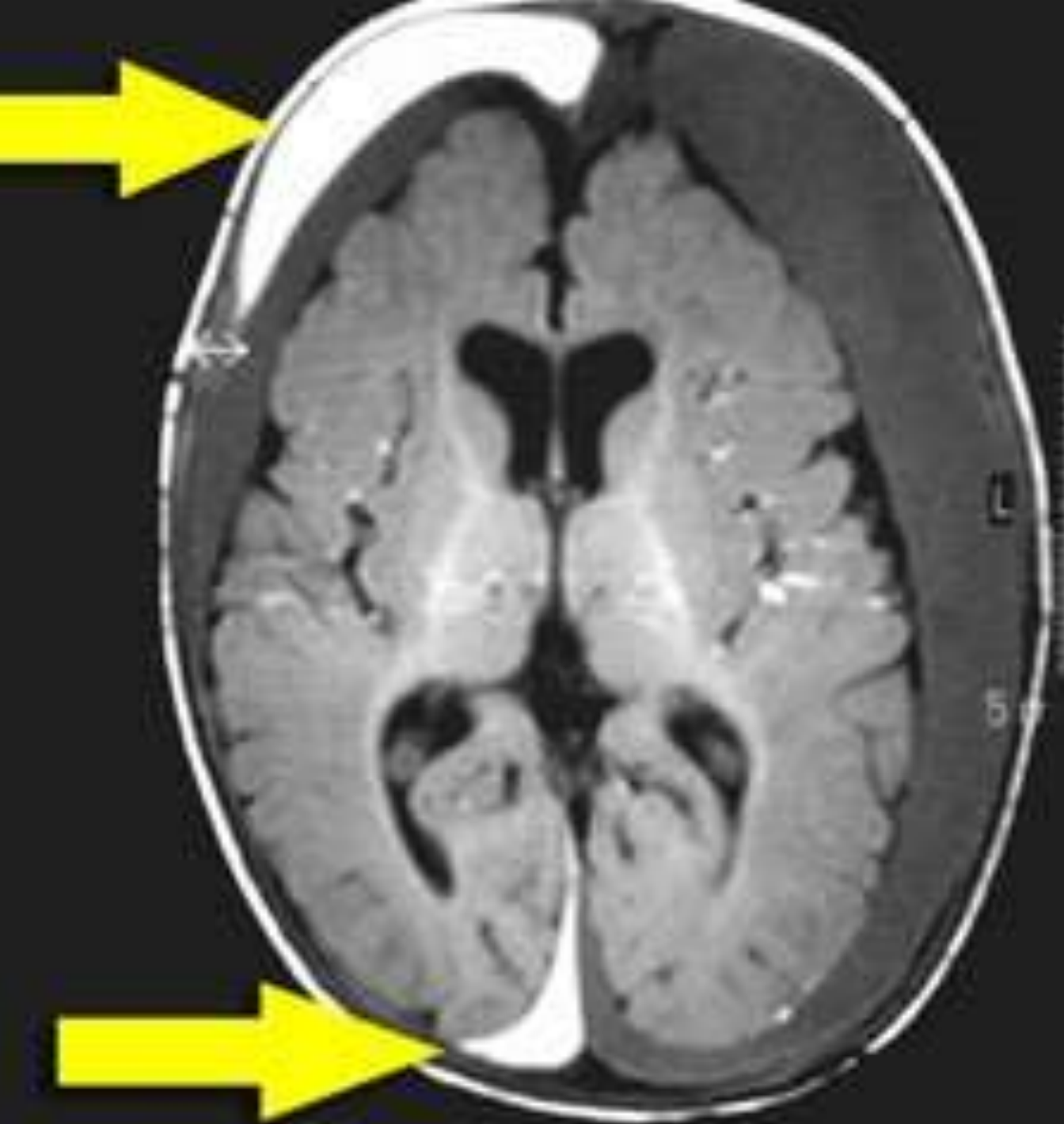


# Brain Hematomas

- Three layers of the brain
  - Dura Mater
    - Thick outer covering
  - Arachnoid Mater
    - Thin “spidery” layer
      - Lots of blood vessels
      - Can have spontaneous hemorrhage
  - Pia Mater
    - Thinnest layer
    - Most Delicate

# Brain Hematomas

- Epidural Hematoma
  - Outside the dura, beneath the skull
    - Frequently associated with skull fractures (parietal)
    - Common with being dropped
      - Outside in trauma
- Subdural hematoma
  - Beneath the dura
    - May become Hygroma (fluid tumor)
    - Associated with acceleration / deceleration
    - May be acute or chronic
    - *May* be caused by meningitis
- Intra-parenchymal bleed
  - Within the brain
  - Causes scarring / long term lesions



# Shaken Baby Syndrome

- Association of Shaking / Squeezing
  - Subdural hematoma
  - Retinal Hemorrhages
    - Other etiologies – meningitis, CPR
  - Symmetric posterior Rib fractures
  - Associated with Metaphyseal Corner Fractures
  - Blunt abdominal trauma
    - Look for elevated enzymes
- Specific pathologic entity – first described in 1972
  - 60% involve boys
  - Most common under 1 year of age
- Need to rule out bleeding disorder
  - Factor XII, Factor VIII

# “Classic” Fractures

## Accidental Trauma

- Toddler’s Fracture
  - Spiral fracture of tibia
  - Intact Fibula
- Torus Fracture
  - Distal radius / tibia
- Supracondylar Humerus fracture
  - Extension pattern, transverse
- Forearm mid-shaft fractures
  - May be occult
  - Both bones always involved

# Cross Examination Tips

# Cross Examination Tips

- Obtain pre trial reports and have them reviewed for accuracy
  - Identify opinions based on primary source verification versus reliance on other sources
- Understand the basis for opinions at time of trial
  - Expose gaps in theories
  - In x-ray reports look to the “findings” section versus the “conclusion” section

# Cross Examination Tips

- Use checklist to make sure all available data is present
  - Make sure secondary skeletal surveys were done
    - If not, why?
    - Use hypothetical to make points
  - If rib fractures are subtle
    - Was bone scan done?
  - Metaphyseal Corner Fractures
    - Can be confirmed by MRI



# Cross Examination Tips

- Do not dwell on “interpretation” opinion
  - Attack basis for that opinion
  - If the basis is false, opinion is not as strong
- Focus on whole picture
  - Identify and analyze patterns or specifically *lack* of patterns of abuse
  - Rare that one injury denotes a pattern

# Fracture 101

# Fracture Healing

- Bone is Alive
  - Blood Supply from both intra-medullary and periosteal sources
- Age determines metabolic rate
  - The younger the patient, the faster the process
- Consistent healing Pattern
  - Stages of healing
  - Acute versus chronic
  - Allow aging of the fracture pattern

# Fracture Healing

- Acute fracture
  - May or may not swell
- Early Callous Formation
  - Appears at 5 to 7 days
- Mature Callus
  - Fracture line disappears at about 4 weeks
- Re-modeling
  - May take years
    - The younger, the better



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# Bone 101

- Children Grow through growth plates on the end of the bone
  - Tube of tooth paste
- Fractures remodel best at the ends of the bone
- Angular deformities correct in the plane of the joint



# Bruises

- Caused by hemorrhage into the skin
  - Small vessels rupture
  - Can be caused by anything disrupting those vessels
    - Petechiae – small punctate hemorrhages
      - May be caused by emboli
    - Can occur in internal organs
      - Thymus gland in the neck

# Bruises

- Resolve by reabsorption
    - Blood products break down
      - Porphyrins
        - Blood pigments
- Blue to red to green to yellow
- Able to date “loosely” by color
    - Depends on metabolic status
    - Depends on nutrition

# Retinal Hemorrhages

- Key link
  - [www.cincinnatichildrens.org/svc/alpha/c/child-abuse/tools/retinal-hemorrhage.htm](http://www.cincinnatichildrens.org/svc/alpha/c/child-abuse/tools/retinal-hemorrhage.htm)
- Bleeding involving small vessels at back of the retina
  - Caused by increase / decrease in pressure
  - Can be unilateral
  - Associated with traumatic brain injury

# Retinal Hemorrhages

- Can it be associated with accidental injury?
  - Case reports of 3 children with household trauma
    - Localized to the posterior pole
  - 215 children – 2 with hemorrhages
    - Both in MVAs
- Can be caused by CPR
  - 117 children examined – 9 positive
- Not caused by seizures

# Retinal Hemorrhages

- Neonates – examined at 1 week
  - Vacuum extraction higher than C section
  - 15% incidence
    - Resolved usually in 1 week – can take up to 6 weeks
- Purtscher retinopathy
  - Ecchymosis of the chest associated with RH
- Terson Syndrome
  - Vitreous hemorrhage associated with subarachnoid hemorrhage

Thank You