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

- Childs 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 Ricketts
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 associates with significant chance of death
“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
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 brake 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

• 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