Interpreting Medical Terminology in Child Maltreatment Cases: A Crash Course for the Non-Medical Professional

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"The single biggest problem in communication is the illusion that it has taken place."

George Bernard Shaw

Case Studies

- Case #1 - Abusive Head Trauma (AHT) & Shaken Baby Syndrome (SBS)
- Case #2 – Fractures
- Case #3 – Skin findings

Abusive Head Trauma (AHT) & Shaken Baby Syndrome (SBS)

- AHT – injury to skull and/or contents of skull particularly brain (intracranial injuries)
- SBS – a particular manifestation of abusive head trauma

Both can be consideredTraumatic Brain Injury (TBI) caused by abuse.

Shaken Baby Syndrome (SBS)

A syndrome is a condition characterized by a set of associated symptoms.

- Subdural hematoma
- Retinal hemorrhage
- Fractures at ends of long bones

INTRACRANIAL INJURIES

- Subdural hematoma (bleeding under the tough “dura mater” membrane that covers the entire brain and Central Nervous System)
  - Produced by direct blows or violent shaking
  - Bleeding result of tearing of the ‘bridging’ blood vessels between the dura and brain
  - Skull fracture may or may not be present
  - History is usually lacking or inadequate to explain trauma

INTRACRANIAL INJURIES -2

- Parenchymal trauma (tissue of the brain; nerves)
  - Diffuse bleeding inside skull
  - Cerebral edema (swelling of brain)
  - Infarctions (obstructions to blood supply) caused by thrombus (blood clots) or embolus (clot or air bubble or fatty tissue) leading to
  - Cerebral atrophy (brain shrinking/loss do to lack of blood/oxygen)
  - Lobe shearing (tearing apart of brain segments) and
  - Basal edema (swelling at the basal ganglia of brain stem areas responsible for basic life functions such as breathing, heart rate, temperature regulation)

INTRACRANIAL INJURIES -3

- Cerebral contusions (bruising) or lacerations (tears in pia-arachnoid membranes of brain)
- Epidural Hemorrhage or extradural hematoma (bleeding between the dura and skull)
  - Epidural hemorrhage is more often seen in accidental falls

Shaken Baby Syndrome (SBS)

- Subdural hematoma
- Retinal hemorrhage
- Fractures at ends of long bones

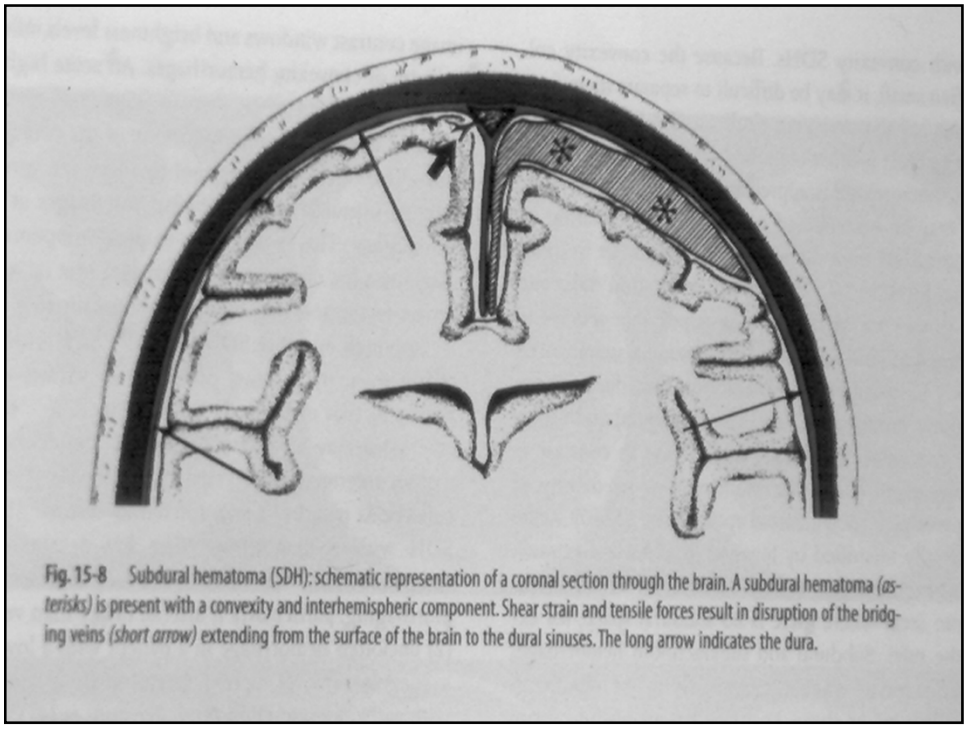
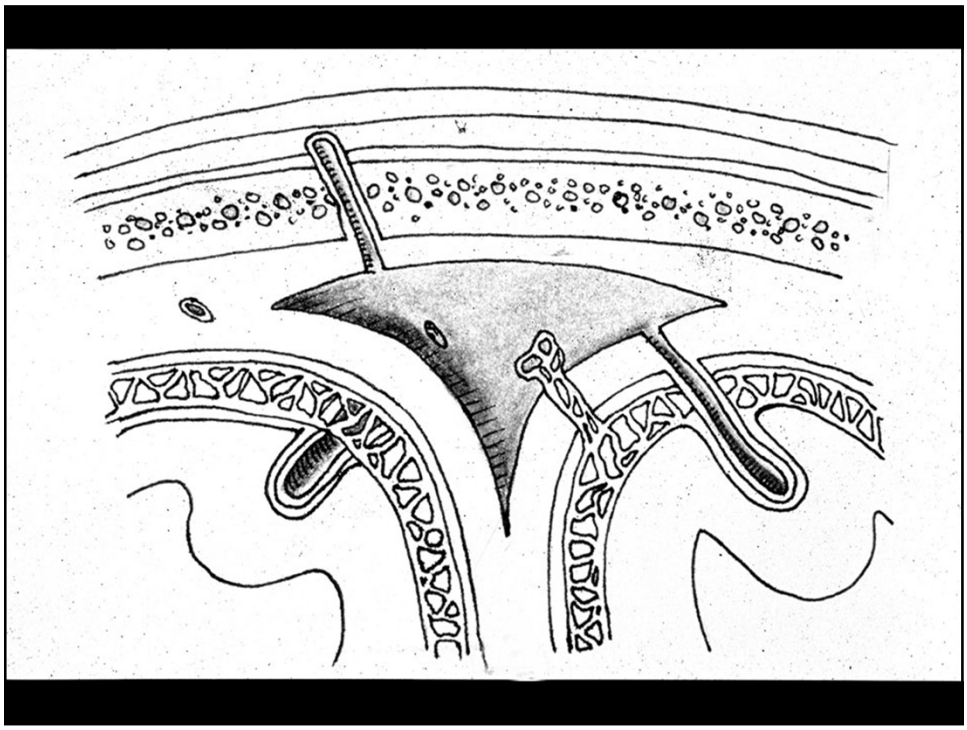


Fig. 15-8 Subdural hematoma (SDH): schematic representation of a coronal section through the brain. A subdural hematoma *(asterisks)* is present with a convexity and interhemispheric component. Shear strain and tensile forces result in disruption of the bridging veins *(short arrow)* extending from the surface of the brain to the dural sinuses. The long arrow indicates the dura.



Shaken Baby Syndrome (SBS)

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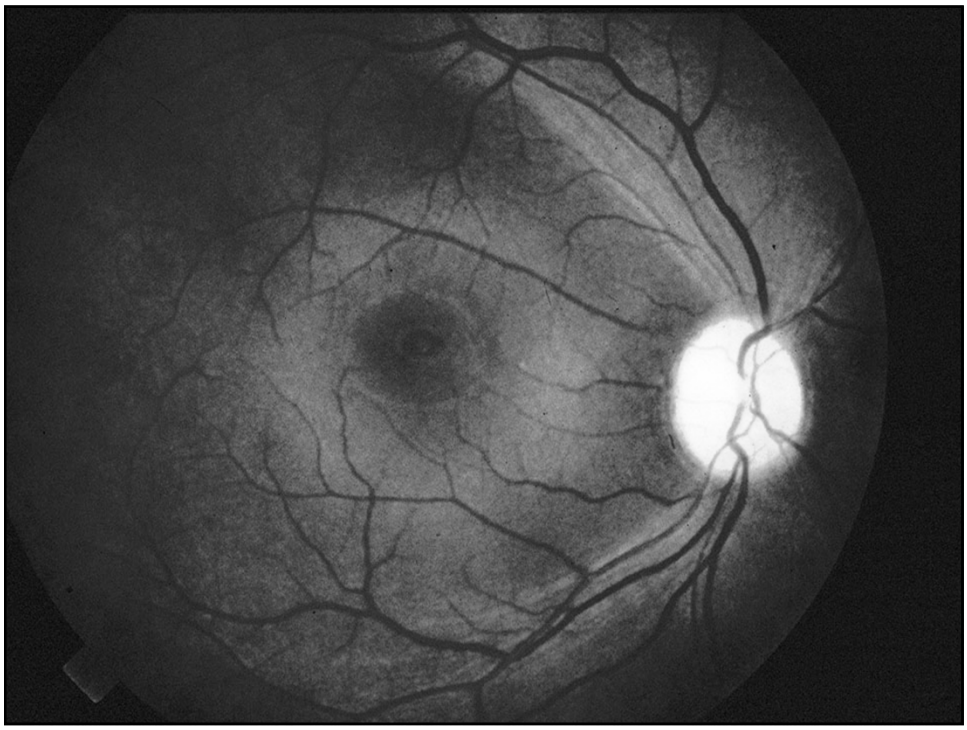
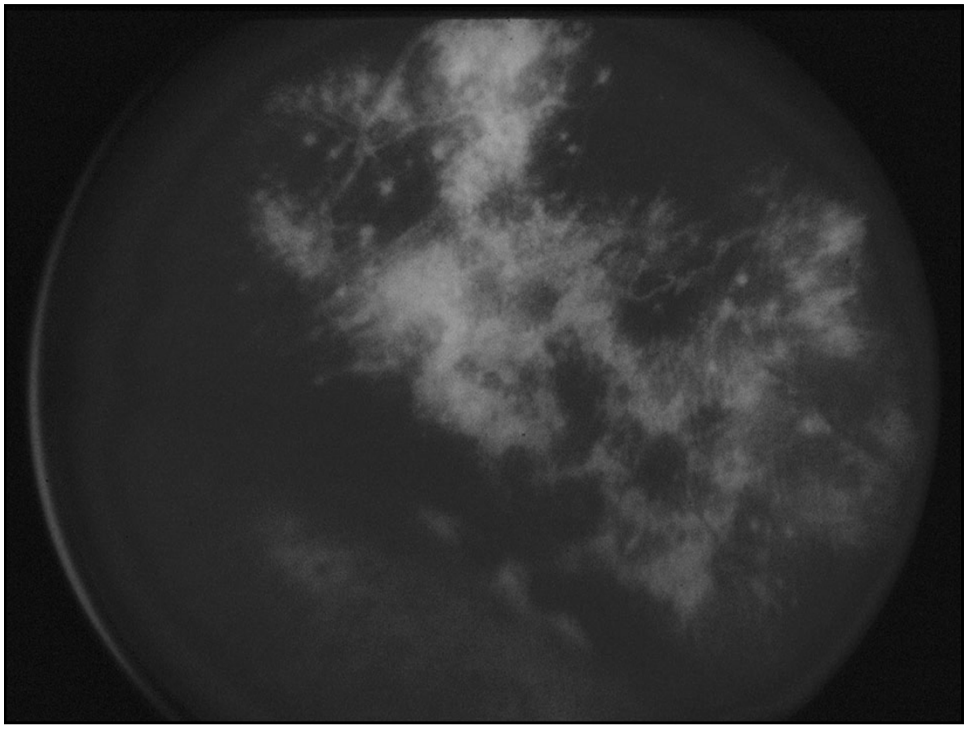
- Fractures at ends of long bones





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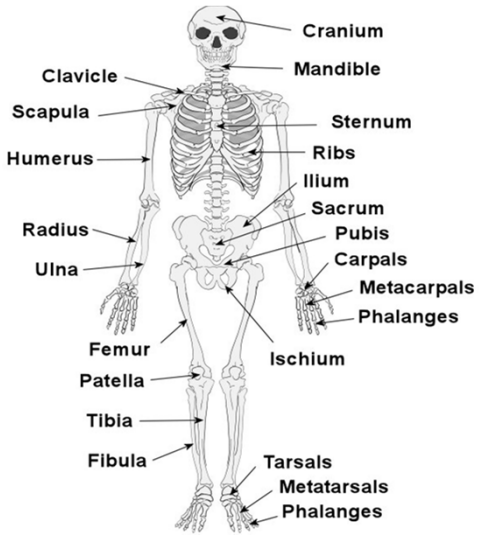
Fractures

Skeletal System



Common Terminology & Fractures

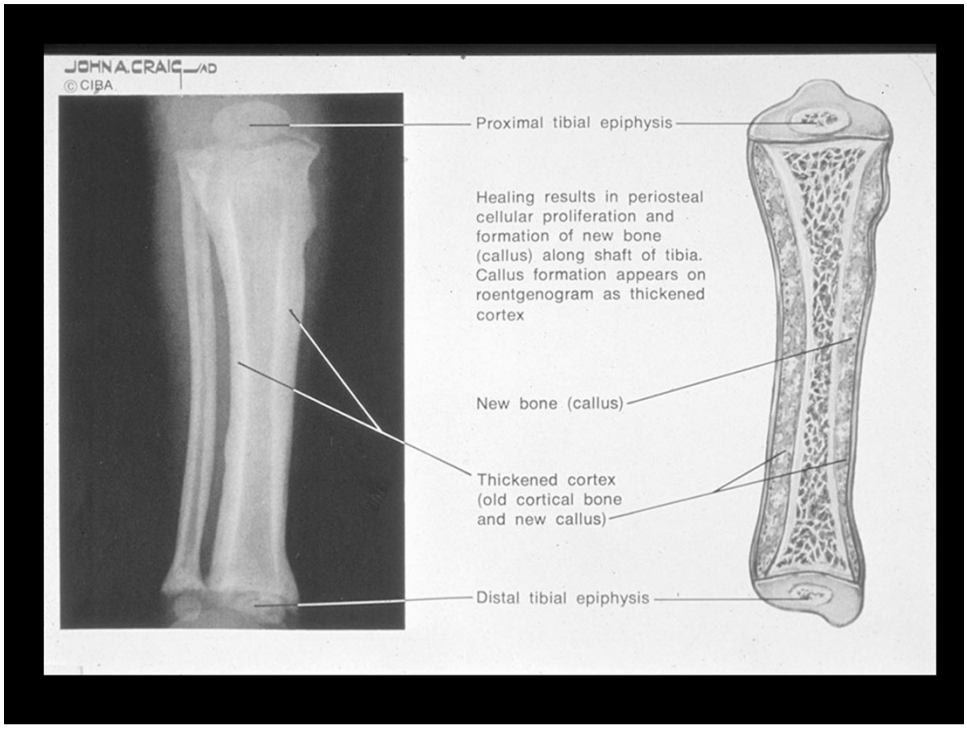
- Proximal – part of bone closest to the main body or spine
- Distal – part of bone most distant to the main body or spine
- Bilateral – same bone on both right and left side

Common Terminology & Fractures - 2

- Epiphysis or epiphyseal – the ends of the long bones
- Metaphysis or metaphyseal – part of bone between the epiphysis and diaphysis; site of “growth plate”
- Diaphysis – the shaft or ‘middle’ of the long bones

Common Terminology & Fractures - 3

- Periosteum - membrane that covers the bone cortex
- Cortex – ‘hard’ mineralized part of bone that surrounds the marrow



Common Terminology & Fractures - 4

- Acute – fracture is recent; 0 – 10 days
- Healing – callus seen; 10 days – 8 weeks
- Mineralization – describes the quality of the bony cortex; abnormal mineralization may indicate disease and fragile bones.

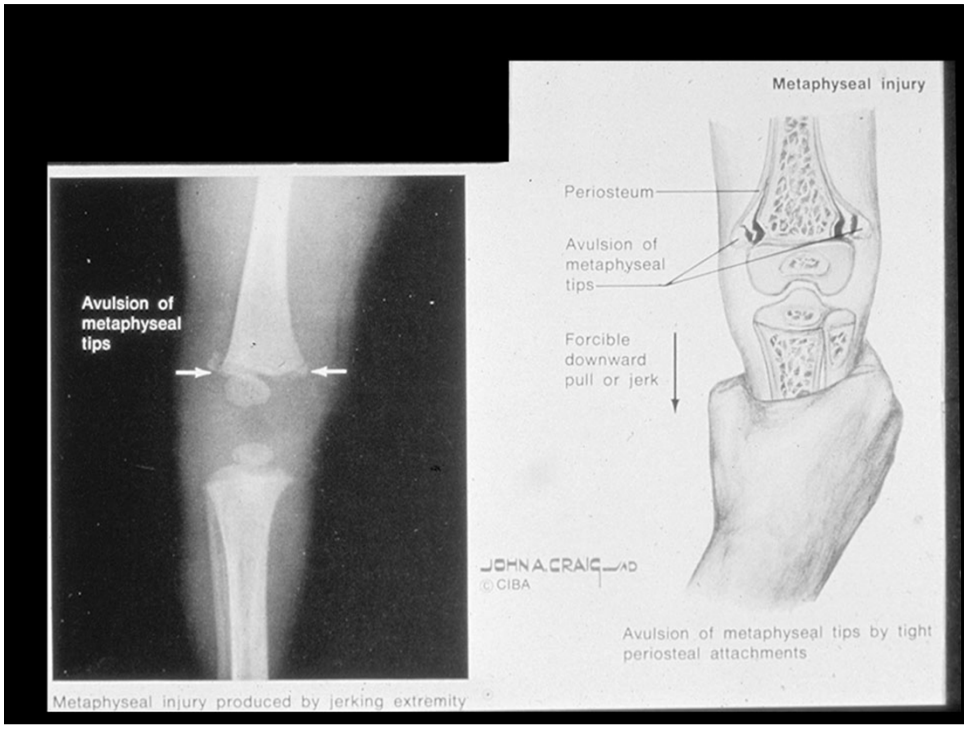
SPECIFICITY OF SKELETAL INJURIES

- Highly specific fractures(diagnostic)
  - Metaphyseal-epiphyseal (<2 years of age)
  - Thoracic cage
    - Rib, sternum
  - Shoulder
    - Scapula
  - Clavicle - at either end
    - Collar bone
  - Spine
    - Vertebral body

Metaphyseal Fractures

- Metaphyseal-ephiphyseal ‘chip’ fractures
- Metaphyseal avulsion fractures
- Bucket handle fractures

All describe the same general type of fracture which is pathognomonic for abuse.



SPECIFICITY OF SKELETAL INJURIES - 2

- Highly suggestive fractures/patterns
  - Multiple: bilateral, symmetric
  - Repetitive/different age
  - Hands and feet
  - Skull, complex fracture line
  - Associated non skeletal injury, intracranial, visceral

SPECIFICITY OF SKELETAL INJURIES - 3

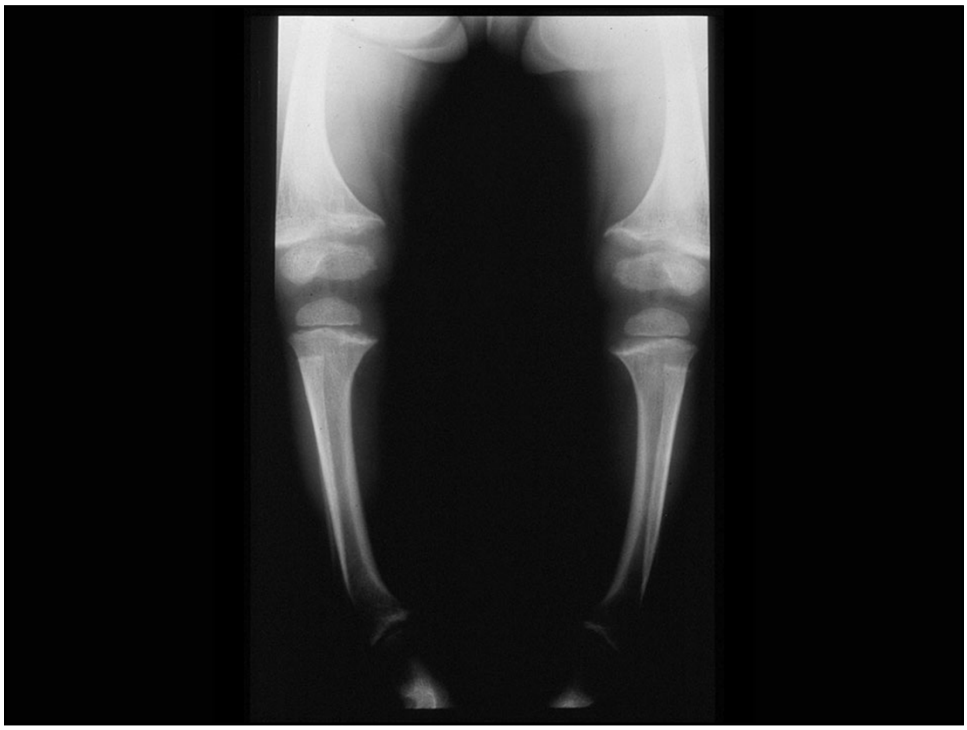
- Nonspecific fractures
  - Diaphyseal (shaft of long bone)
  - Clavicular, mid shaft
  - Skull, linear
- Merten, et. al, Child Abuse, 2nd Edition, Reese, 2001

ABUSIVE FRACTURES

- Long bone and ribs are the most likely broken bones to show up in abuse
- 80% of rib fractures in children <18 mos are not accidental

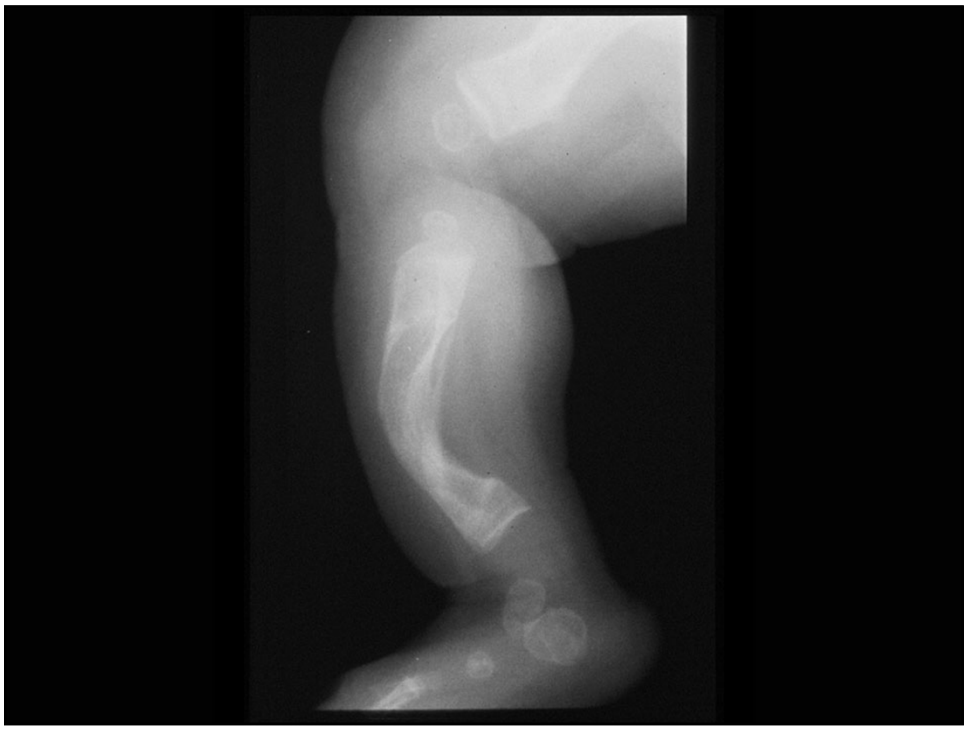
DIFFERENTIAL DIAGNOSIS OF FRACTURES

- Hereditary bone disease
  - Osteogenesis imperfecta
- Metabolic bone disease
  - Rickets (Vitamin D deficiency)
- Infectious conditions
- Tumors



OSTEOGENESIS IMPERFECTA

- Four types
- Type IV extremely rare. Most problematic differential of child abuse

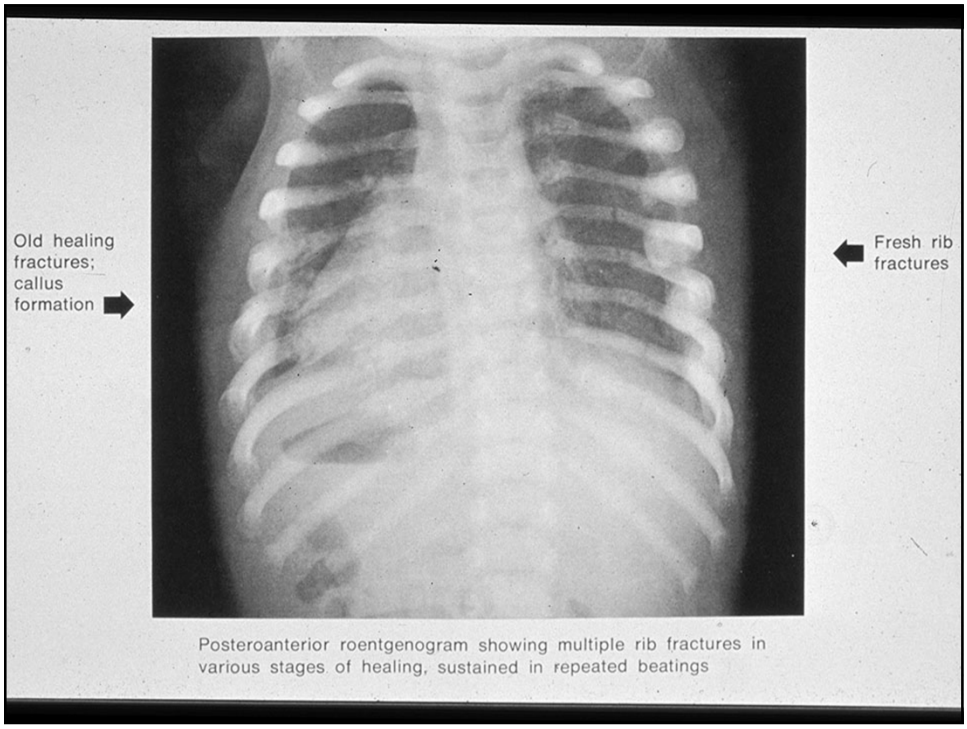


ABUSIVE FRACTURES

- 55-70% of all abusive fractures occur in infants less than 1 year of age
- Only about 2% of *accidental* fractures are found in infants less than 18 months old

POSTERIOR RIB FRACTURES

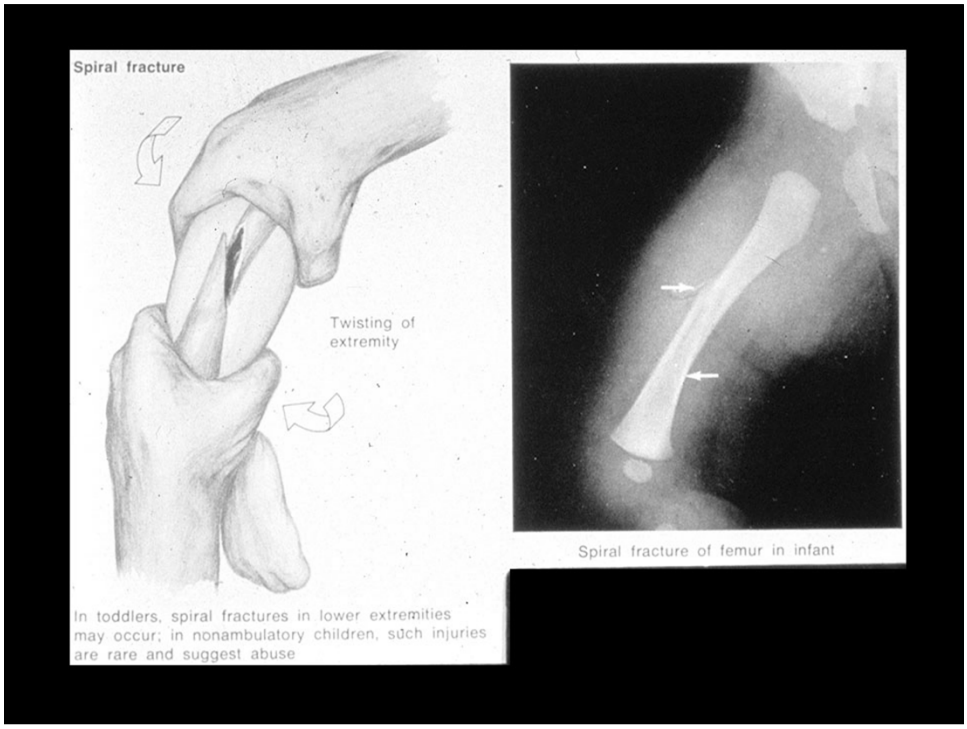
- Never due to accident in normal infant
- Do not occur with CPR with young children
- Direct blow cannot create this fx



Posteroanterior roentgenogram showing multiple rib fractures in various stages of healing, sustained in repeated beatings

HEALING OF FRACTURES

- Soft tissue inflammation over site: 1 to 2 days-3 to 4 weeks
- Soft callus (new bone) formation
  - 7 to 10 days in infant and young child
  - 10-14 days in older child and adult
- Hard callus: 2 weeks to 3 months
- Remodeling: 3 months to 2 years
- (Note: skull and metaphyseal chip fractures cannot be dated)



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Skin findings

- Bruise – a superficial injury produced by impact without laceration (cut or abrasion); a contusion
- Contusion – a bruise; an injury without a break in the skin

Skin Findings - 2

- Hematoma – a localized collection of blood, usually clotted, due to break in the wall of a blood vessel
- Hemorrhage – the escape of blood from the vessels; bleeding

Skin Findings -3

- Purpura – blue or purple-colored spots and patches that occur on the skin, and in mucus membranes including the lining of the mouth due to intradermal and submucosal bleeding.
- Ecchymosis- purpura spots larger than 1 centimeter in diameter.
- Petechia – purpura less than 3 millimeters Are pinpoint, non-raised, perfectly round.

DATING BRUISES

- Yellow > 18 hours
- Red, blue, purple or black may be present from 1 hour to resolution
- Red present in all bruises irrespective of age of bruise
- Bruises of identical age and cause may not be the same color
  - Lauglois and Gresham, Forensic Sci. Int., 1991

DIFFERENTIAL DIAGNOSIS OF BRUISING

- Hematologic: bleeding disorders
- Metabolic: vitamin K deficiency
- Infectious: clinically apparent or sub-clinical infections
- Normal pigments: Mongolian spots
- Allergic skin reactions
- Folk medicine remedies: cupping, rubbing

BRUISING AS A CLUE TO RECOGNIZE ABUSIVE HEAD TRAUMA

- 173 cases of AHT in kids <3 yr in which injury was missed on a previous visit
- 31% of cases had been missed
  - 37% had face and or scalp injuries
  - 19% had other body trauma
  - The bruises and abrasions were thought to be accidental when babies weren't mobile
- Risk to the infant: further brain injury or death

References & Resources

Understanding the Medical Diagnosis of Child Maltreatment: A guide for the non-medical professional, ed- C. Brittain. 2005

Available through Amazon as Kindle (~$18) and paperback (~$30)

References & Resources

MedDRA (Medical Dictionary for Regulatory Activities) – based on Dorland's Medical Dictionary

www.meddra.org – free to non-profit/non-commercial

CMEP
The Child Medical Evaluation Program

http://www.med.unc.edu/cmep/

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