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 considered Traumatic 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
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-epiphyseal ‘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

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
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
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 ABEusive 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

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