CRANIOCEREBRAL TRAUMA

OBJECTIVES

- Imaging Modalities
- Skull Fractures
- Intracranial Bleed – Extra-axial & Intra-axial
- Brainstem injury
SKULL RADIOGRAPHS

DISADVANTAGES

- Does not help Rx
- Time inefficient
- Cost money
- Unnecessary radiation

IMAGING OF CRANIOCEREBRAL TRAUMA

IMAGING MODALITIES

- CT
- MR Imaging – Sub acute
- Cerebral Angiography
SKULL FRACTURES

CRANIOCEREBRAL TRAUMA

SKULL FRACTURES

• Depressed Skull Fractures

• Skull Base Fractures
CRANIOCEREBRAL TRAUMA

SKULL BASE Fx (n=40)

• Transverse Pattern
  Anterior Transverse (AT)  22/40
  Posterior Transverse (PT)  16/40

• Diagonal Pattern
  Lateral Frontal Diagonal (LFD)  7/40
  Mastoid Diagonal (MD)  3/40

OCW, SEM, KS. Radiology 1993;188:329-38
CRANIOCEREBRAL TRAUMA

OUTCOME (n= 40)

- Cognitive Defect 20/25 80%
- Cranial Nerve Palsy 16/40 40%
  CN2, CN3, CN4, CN6, CN7, CN8
- CSF Leak 7/40 18%
- Hearing Loss 10/40 25%
- Death 11/40 28%

OCW, SEM, KS. Radiology 1993;188:329-38
CT SCAN

TECHNIQUE

• 0.75 mm detector width
• PACS - 6mm
• Kv 140, mAs270
• Reviewed - Parenchymal, Bone & Sub dural W/L
INTRACRANIAL BLEED

EXTRA AXIAL BLEEDS
SUBDURAL HEMATOMA

PATHOGENESIS

• Arachnoid & Inner dura
• Bridging cortical veins
• Low pressure bleed
• ICP = venous pressure
SUBDURAL HEMATOMA

LOCATION

- Contrecoup
- Convexity, falx, tentorium
- Posterior fossa – infants
- Intra cranial injury
SUBDURAL HEMATOMA

INDIRECT SIGNS

- Effacement of Salci
- Distortion of ventricles
- Mid line shift
- Thick gray matter
SUBDURAL HEMATOMA

ATYPICAL

- Mixed attenuation – Hyper acute, Mixing, Serum extrusion, Bleeding into old SDH
- Lentiform shape - Hyper acute, cerebral atrophy
EPIDURAL HEMATOMAS
CEREBRAL CONTUSIONS

CEREBRAL CONTUSION

PATHOGENESIS

- Cortex VS Inner Table
- Relative Sparing - White Matter
- > 5 cm H. Contusion - Hematoma
- Coup / Contra Coup
DIFFUSE AXONAL INJURY

PATHOGENESIS

• Rotation Force
• Impact - Lateral / Oblique
• Relative Tissue Inertia
• Centripetal Progression
DIFFUSE AXONAL INJURY

CT FINDINGS

• Gray-white Junction - Fronal, Temporal, Lobes (Grade 1)
• Corpus Callosum – Splenium (Grade 2)
• Brain-stem – Dorsolateral (Grade 3)

DIFFUSE AXONAL INJURY

IMAGING - CT

• CT -normal but MRI +
• CT & conventional MRI - under estimates extent
• Whole brain peak ADC values
BRAIN-STEM INJURY

MECHANISMS

• Primary - Shearing Injury
  - Direct impact – Blunt or penetrating
  - Disruption - pontomedullary junction

• Secondary - Duret Hemorrhage,
  - Hypoxia / Ischemia
BRAIN STEM HEMORRHAGE

Duret Hemorrhage

• Secondary bleed
• Trans tentorial herniation – downward
• Several mechanism – reperfusion bleed, rupture of brainstem perforators, venous infarction
The Extra-axial Collections

Normal Meningeal Anatomy (coronal view)

The “Scout” View

Look at it... everywhere!

32 y/o with prior TBI; new seizure