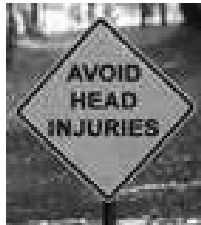
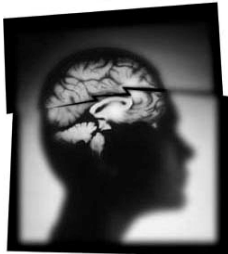


CRANIOCEREBRAL TRAUMA



TBI FACTS

- 1.5 million sustain TBI every year
- 50,000 deaths; 80,000 with disability
- Peak occurrences 15-24 years and >75 years
- Leading causes transportation & falls in elderly
- Cost \$48.3 billion per year



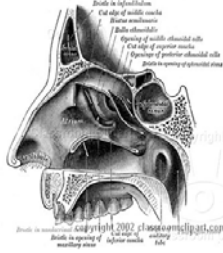
TERMINOLOGY

- Direct head injury
- Open & closed head injuries
- Coup & Contrecoup injury
- Missile injury



BASILAR SKULL FRACTURES

- No nasal suctioning
- NG through mouth
- No Valsalva or vigorous coughing
- Do not drink with a straw
- Sterile dressing for CSF drainage
- "Halo sign"
- PC: meningitis





-Irreversible

-Alterable

PRIMARY BRAIN INJURY

- Occurs at time of impact
- Direct traumatic forces that injure & kill brain cells
- Concussion, contusion, skull fractures, hemorrhage



SECONDARY INJURY

- Damage & death of brain cells that initially survived traumatic event
- Depends upon severity of primary injury
- IICP, cerebral edema, hematoma, infection, brain herniation
- Results in increased mortality

CONCUSSION

- Traumatically induced alteration in mental status (amnesia a hallmark sign)
- Less than 10% result in LOC
- After a concussion 4 – 6X more likely to sustain 2nd concussion

CONCUSSION

- Cumulative effect with repeat concussion
- Second Impact Syndrome



**Concussion Red Flags
CDC – Heads Up Program**

- Headaches that worsen
- Looks very drowsy; cannot be awakened
- Cannot recognize people or places
- Unusual behavior change
- Seizures
- Repeated vomiting
- Increasing confusion
- Increasing irritability
- Neck pain
- Slurred speech
- Weakness or numbness in arms or legs
- Loss of consciousness

Maddock's Questions Battery

- For sports related head trauma
- Where are we playing?
- Which team are we playing?
- What quarter/inning is it?
- Which team did we play last week?
- Did we win last week?



CONTUSION

- Trauma to brain tissue
- Often occurs with laceration
- Cerebral edema – more pronounced 3 – 4 days after injury
- Contrecoup injuries

DAI & BRAIN STEM INJURY

- Diffuse axonal injury or shearing
- Associated with prolonged comatose state
- Acceleration – deceleration & high velocity injuries
- Brain stem injury can be immediate primary injury or develop later with secondary injury

HEMORRHAGE

- Epidural
- Subdural
- Intracerebral



EPIDURAL HEMATOMA

- Arterial bleeding between skull & dura
- Fracture of temporal bone with damage to middle meningeal artery
- “Talk & die;” initial lucid interval

SUBDURAL HEMATOMA

- Venous bleeding between dura and arachnoid
- Highest incidence of hematomas – 24% pts with severe head injury
- Elderly & alcoholic more at risk
- Acute, subacute & chronic

INTRACEREBRAL HEMATOMA

- Bleeding within brain tissue
- Accompanies serious contusions & lacerations
- DTICH – delayed traumatic intracerebral hematoma

PREDICTING OUTCOME IN SEVERE HEAD INJURY

- Hypotension & hypoxia critical
- Hypotension with or without hypoxia doubles mortality rate
- B/P < 90, ICP > 20 mm Hg
- Age > 20

SEQUELAE AFTER SEVERE HEAD INJURY

- Personality & behavior changes
- Post traumatic epilepsy
- Post concussion syndrome
- Hydrocephalus



PREVENTION

- Seat Belts
- Helmet use
- Drinking & driving
- Decrease violence
- Safe playgrounds
- National Head Injury Foundation