The pathology of head injury

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Missile Injury

Common non-criminal head injuries

- Road traffic accidents (pedestrians, passengers, drivers, vehicles, bicycles)
- Suicide – fall from heights
- Industrial accidents
- Domestic accidents (elderly people, fall at home, in the street)
- Street accident (falling objects, walls)
- Natural disasters
- Sports injuries
TYPES OF SKULL FRACTURES

- Linear fracture
- Depressed fracture
- Fracture of base of skull
Types of Fractures

LINEAR ("BURSTING") FRACTURES:

DEPRESSED ("BENDING") FRACTURES:

Linear fracture
Depressed and comminuted fracture

Fracture base of skull At middle cranial fossa

Fracture of base of skull

Difficult to visualize Base of skull
FRACTURES OF BASE OF SKULL

• Often indicates severe head injury
• Otorrhoea
• Rhinorrhoea
• Difficulty of visualization in plain X ray

Fatal head injuries do not always have a fracture
The brain is more important than the skull

Secondary injuries

Cerebral swelling (edema)
Hypoxia / ischemia
(Associated injuries, convulsions)
TRAUMATIC HEMATOMAS

- Acute subdural hematoma
- Chronic subdural hematoma
- Epidural hematoma
- Cerebral hematoma (contusional haematoma)

Acute subdural hematoma

Subdural haematoma causing Depression of underlying brain
Bridging veins on the surface of the brain connect to the superior sagittal sinus.

Chronic subdural hematoma (CSH) is a collection of blood between the brain tissue and the dura mater. It is most commonly found in elderly individuals and is often associated with a history of head trauma or increased intracranial pressure.
From Dr X.L. Zha's lecture

INTRACRANIAL PRESSURE (ICP): Consequence of ↑ ICP

Cerebral edema

Uncal herniation

Tonsillar herniation

Brain stem is compressed in Uncal herniation

Tonsillar herniation – compression of medulla
Uncal herniation
Medial part of Temporal lobe

Unchecked supratentorial pressure
Leads to downward displacement
Of brain stem and cerebellum and
The perforating branches of the Posterior circulation of Circle of Willis are stretched.

Tentorium

Subdural hematoma

Commonest space occupying lesion in head injuries
Rupture of bridging veins over sagittal sinus
Chronic subdural hematoma as a cause of dementia
Epidural hematoma

- Lucid interval
- Neurosurgical emergency
- Fracture of temporal bone
- Rupture of middle meningeal artery
PRIMARY INJURIES TO BRAIN

- Contusion / laceration
- Diffuse axonal injuries

Contusions at bases of both frontal and temporal lobes
Contusions at crests of gyri

Dorsal contusion of medulla oblongata secondary to basal skull fracture.

Contusions at crests of gyri

Fracture

Contusions
Spinal cord injuries

- Patient is conscious
- Paraplegia
- Urinary retention

- Stability of the vertebrae
- Chronic care

"Contrecoup" – opposite the area of impact

Contusions of the spinal cord

From Robbins' Textbook of Pathology
DIFFUSE AXONAL INJURY

- Hemorrhagic lesions in corpus callosum and brain stem
- Axonal balls histologically
Hemorrhage in cerebellar peduncles
In axonal injury

Hemorrhage in corpus callosum
In Axonal injury

Axonal injury
Hemorrhage in
Dorsal Brain Stem

Retracted axonal balls
Diffuse axonal injury (DAI)

A white matter injury
Major cause of prolonged comatose state in head injury
Hemorrhage in corpus callosum & dorsal brain stem
Commoner in rotational type of injury
Frequent absence of other mass lesions

Pathology of head injury - Implications for clinical management

Assess comatose status: Glasgow coma scale
Reduce cerebral swelling
Evacuate mass lesion
Prevent hypoxia / hypercapnia
Close monitor of raised intracranial pressure