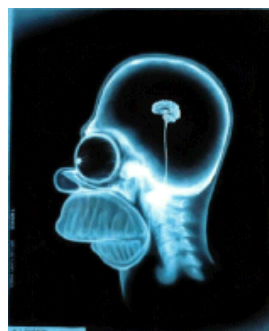




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Title:

Head Trauma: Assessment and management



- 1. Spine center of Excellence, YAS hospital**
- 2. Department of Neurosurgery, Shariati Hospital
Tehran University of Medical Sciences**

1400/09/23



Session Overview

- Definition & Importance
- Review of head injury types
- Initial assessment / risk stratification
- Management
- Safety netting
- Red flags

Definition

Head injury is defined as any trauma to the head other than superficial injuries to the face (NICE 2017)

Traumatic brain injury (TBI) is a non specific term describing blunt, penetration or blast injuries to the brain. TBI can be classified as mild, moderate or severe, typically based on the GCS



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Why important?



- 1.4 million attendances in EDs England & Wales with head injuries
- 200,000 admitted to hospitals pa
 - Of these 1 in 5 have skull fracture or evidence brain damage
- 95% people sustained head injury normal / minimally impaired conscious level (GCS >12)
- Lower GCS increased morbidity / mortality
- Although most recover without specialist intervention others experience long-term disability

Head Injury: Assessment & Early Management, NICE, January 2014



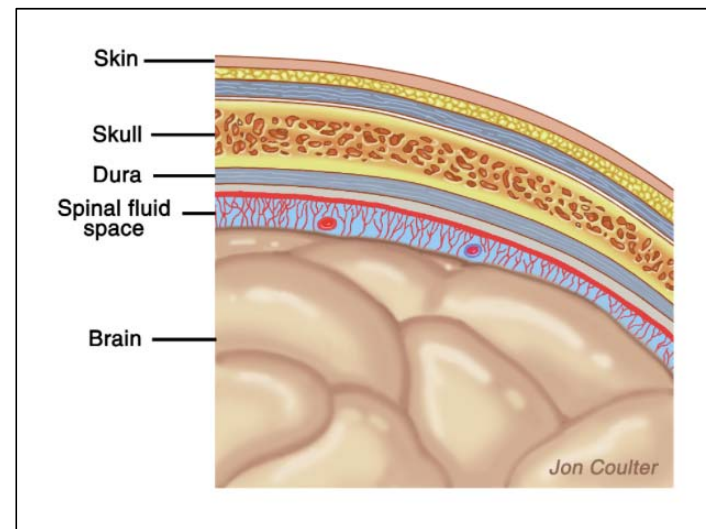
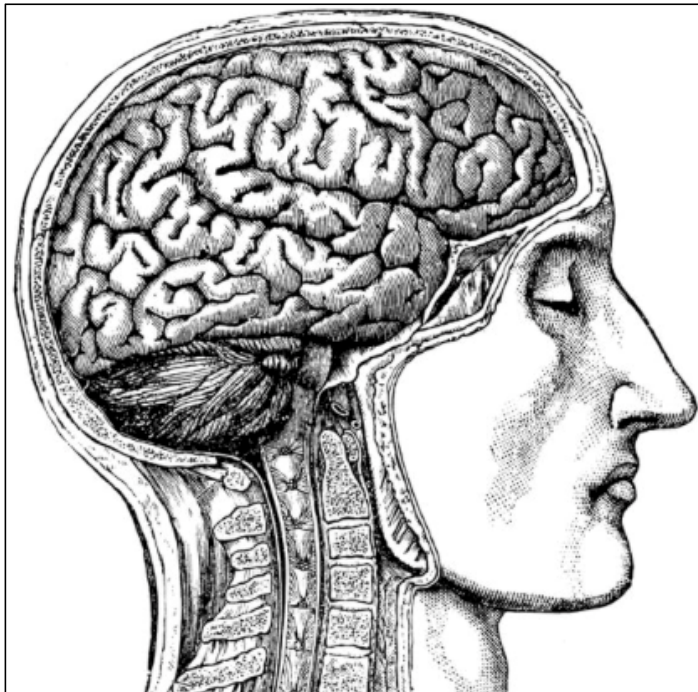
Why Care?

- Head injury commonest cause of death / disability in people aged 1 – 40 years in UK and europe
- High potential for poor outcome (especially if not recognised)
- Deaths occur at three points in time after injury:
 - Immediately after the injury
 - Within 2 hours after injury
 - 3 weeks after injury



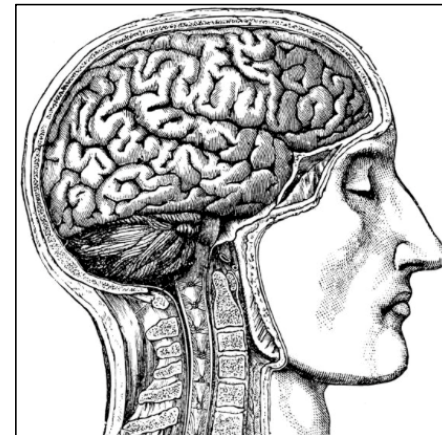
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Basic Anatomy



Munro – Kellie Hypothesis

- “The skull is a rigid compartment with non-compressible components.”
 - Brain (80%)
 - Blood (10%)
 - CSF (10%)



Recap the Definition

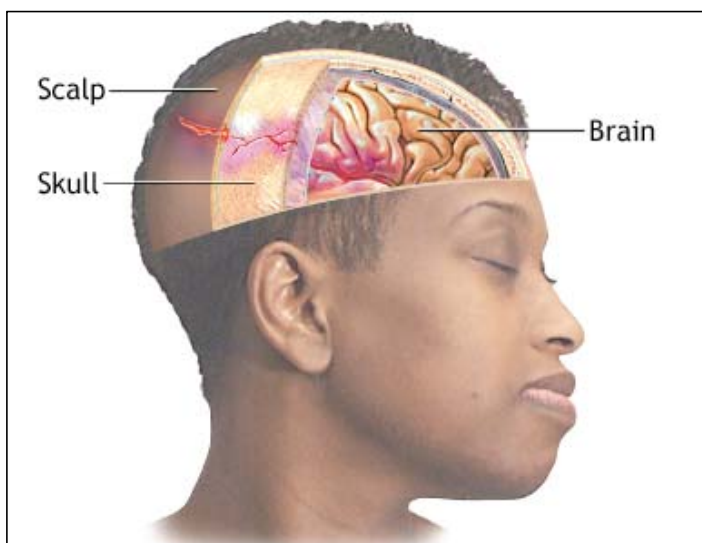
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Head Injury



Head Injury Classification

- Glasgow Coma Scale (GCS)
- Blunt (closed) or penetrating (open)
- Direct or indirect
- Injury type eg concussion, extradural haematoma



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Classification according to GCS



- Mild: GCS 13 - 15
- Moderate: GCS 9 - 12
- Severe: GCS 3 - 8





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Head Injury Assessment



History

Examination

Investigations



Head Injury - History

- Patient details – age / details
- Mechanism & timing
- Vomiting
- Seizure
- Severe / persisting headache
- Pre-traumatic amnesia
- Past medical history
- Medications (especially anticoagulants)
- Social history

Head Injury - Examination

- GCS
- Pupils
- General behaviour
- Suspicion of skull fracture (depressed / basal)
- Neurological examination
- Neck examination
- Other injuries as indicated





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Glasgow Coma Scale



TABLE 349-1 Glasgow Coma Scale for Assessment of Coma and Impaired Consciousness

Eye Opening	Best Motor Response	Best Verbal Response
4 = Spontaneous	6 = Obeying	5 = Oriented
3 = To speech	5 = Localizing	4 = Confused
2 = To pain	4 = Withdrawing or Normal Flexing	3 = Inappropriate
1 = None	3 = Abnormal Flexing	2 = Incomprehensible
	2 = Extending	1 = None
	1 = None	

Data from Teasdale G, Jennett B. Assessment of coma and impaired consciousness. A practical scale. *Lancet*. 1974;2:81-84.





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Glasgow Coma Scale



EYES	Spontaneous	●
	To sound	●
	To pressure	●
	None	●
VERBAL	Orientated	●
	Confused	●
	Words	●
	Sounds	●
	None	●
MOTOR	Obey commands	●
	Localising	●
	Normal flexion	●
	Abnormal flexion	●
	Extension	●
	None	●





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Glasgow Outcome Scale



TABLE 349-2 Glasgow Outcome Scale (Original 5-Point Scale and Extended 8-Point Scale) for Assessment of Outcome

Summary	Glasgow Outcome Scale	Extended Glasgow Outcome Scale
Sleep/awake, nonsentient Conscious but dependent	1 = Dead	1 = Dead
	2 = Persistent vegetative state (PVS)	2 = Persistent vegetative state (PVS)
	3 = Severe disability (SD)	3 = Lower severe disability (Lower SD) 4 = Upper severe disability (Upper SD)
Independent but disabled	4 = Moderate disability (MD)	5 = Lower moderate disability (Lower MD) 6 = Upper moderate disability (Upper MD)
May have mild residual effects	5 = Good recovery (GR)	7 = Lower good recovery (Lower GR) 8 = Upper good recovery (Upper GR)

Data from Jennett B, Bond M. Assessment of outcome after severe brain damage. *Lancet*. 1975;1:480-484; and Wilson JT, Pettigrew LE, Teasdale GM. Structured interviews for the Glasgow Outcome Scale and the extended Glasgow Outcome Scale: guidelines for their use. *J Neurotrauma*. 1998;15:573-585.



Wound Exploration

- Need managed correctly – ensure cleaned adequately
- Boggy Swelling = Higher risk of skull fracture
- Consider depressed skull fracture / compound injury in all open wounds
- May bleed +++

Head Injury - Investigation

- Observations
- Record GCS - commence head injury chart
- Blood sugar
- Wound exploration
- Referral for ED assessment if concerns



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NICE CT Indications



NICE Guidance CG176, 2014

- CT head scan with any of the following risk factors within 1 hour:
 - GCS<13
 - GCS<15 at 2 hours
 - Open or depressed skull fracture
 - Any sign of basal skull fracture
 - Post-traumatic seizure
 - Focal neurological deficit
 - >1 episode of vomiting
- CT head scan patients that have experienced **Loss of consciousness** or **amnesia** AND any of the following risk factors:
Within 8 hours
 - Aged 65 years or over
 - History of bleeding or clotting disorders
 - Dangerous mechanism of injury
 - >30 minutes retrograde amnesia of events
- CT head scan patients with no other indications for CT head scan AND having warfarin treatment, within 8 hours

- These are indications for head CT scan in UK EDs
- Patients who do not meet CT criteria may still need assessed and observed in hospital – be **vigilant** (eg severe nausea, headache, “just not right”, etc....)





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Head Injury Spectrum





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Head Injury Types



- Contusion
- Subdural hematoma
- Extradural hematoma
- Traumatic subarachnoid haemorrhage
- Skull fracture
- Concussion
- Scalp laceration





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Cerebral Contusion



- Bruising to the brain surface
- Usually caused by trauma of brain being thrown around inside the skull
- Often accompanied by cerebral oedema
- Contusions size and oedema can increase post injury
- **Peak risk for swelling is days 3-5 post injury**
- Increase risk of seizure activity





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Cerebral Contusion





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Subdural Haematoma

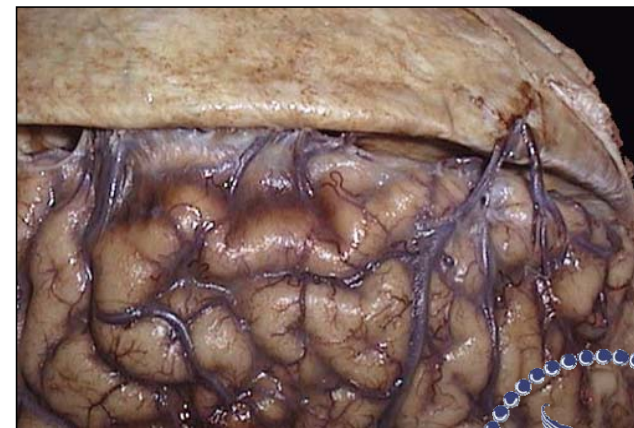
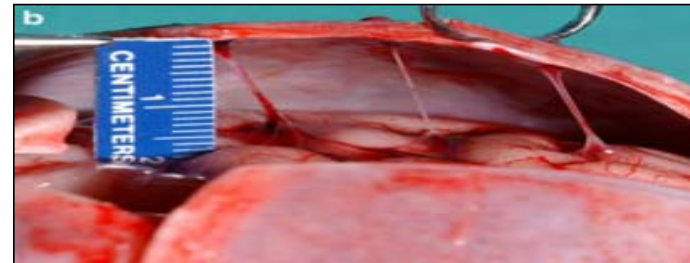


- Blood gathers between the inner layer of the dura mater and the arachnoid mater. Usually resulting from tears in bridging veins which cross the subdural space
- Venous bleed
- Subdural haemorrhage may cause an increase in intracranial pressure (ICP) which can cause compression of and damage to delicate brain tissue



Subdural Haematoma

- Tear in a “Bridging Vein”
- Caution:
 - Alcohol dependant patients
 - Elderly patients
 - Anti-coagulant usage





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Subdural Haematoma



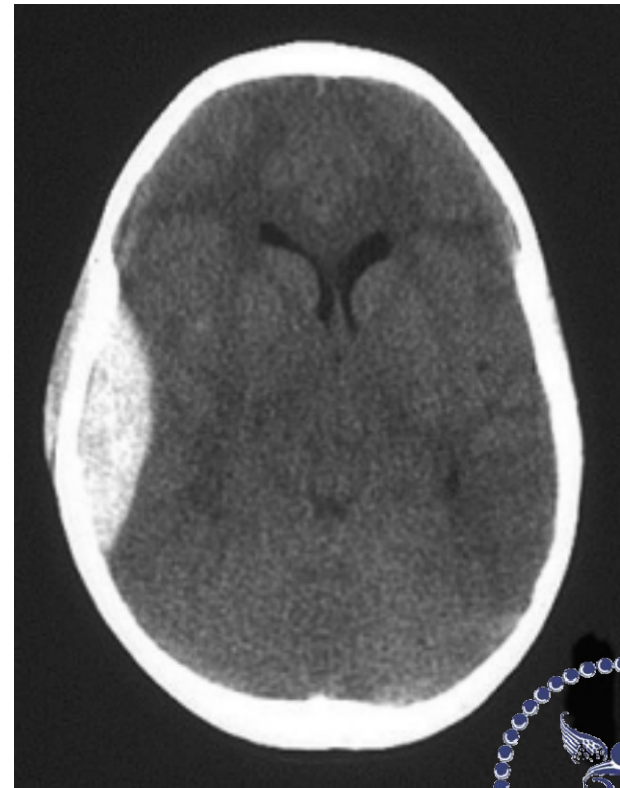


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Epidural Haematoma



- **Extradural hematoma** is when bleeding occurs between the tough outer membrane covering the brain and the skull
- Arterial bleed



Epidural Haematoma

- More common in younger patients
- Usually results from an arterial bleed
- Patients often have a “LUCID PERIOD” with relatively few symptoms followed by a rapid deterioration
- Carry good prognosis if diagnosed in time

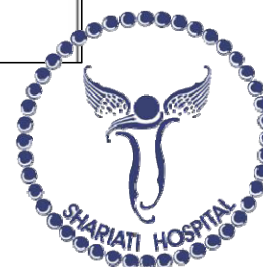
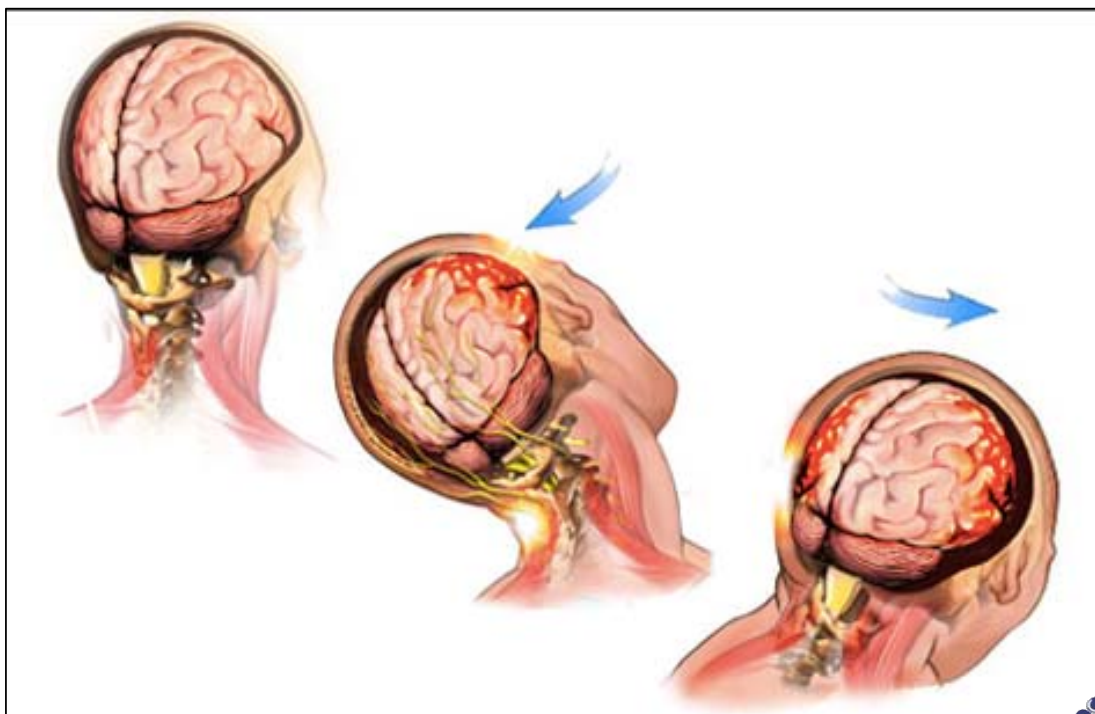
Concussion

- A concussion is a mild traumatic brain injury caused by a blunt jolt or blow to the head
- The sudden movement causes the brain to bounce around or twist inside the skull
- This leads to stretching and damaging of brain cells and causes chemical changes in the brain



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Concussion





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Concussion



- Concussion is regarded as a traumatic brain injury
- Can result from a direct or indirect blow to the head
- LOC is not required
- Children are more vulnerable
- Symptoms can evolve over minutes or hours after the event
- Helmets / scrum caps do not protect against concussion
- Not just sport



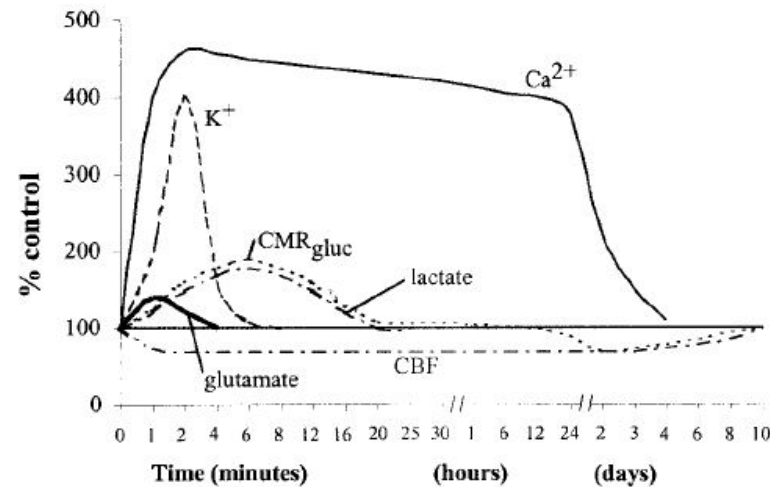


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Chemical changes from Concussion



- Concussive symptoms result from neuro hormonal imbalance:
Limited evidence in regards to structural injury





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Concussion Management





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Scat5 Test



SCAT5[®]

SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION

DEVELOPED BY THE CONCUSSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY

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FEI

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals¹. The SCAT5 cannot be performed correctly in less than 10 minutes.

Key points

- Any athlete with suspected concussion should be **REMOVED FROM PLAY**, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.





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Final Note



- Perform thorough work-up
- Know the red flags
- Follow head injury method
- Wound management
- Safe discharge policy
- Concussion awareness





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References

NICE Clinical Guidelines 56 – Head Injury: Triage, assessment, investigation and early management of head injury in infants, children and adults

<http://guidance.nice.org.uk/CG56/Guidance/pdf/English>

- SIGN 46 – Early Management of Patients with Head Injury.
- www.sign.ac.uk/pdf/sign110.pdf
- Hickey, J.V (2003) The Clinical Practice of Neurological and Neurosurgical Nursing.
- Sport Concussion Assessment Tool 2 SCAT2: International Rugby Board Concussion Guidelines (2011)
- www.irbplayerwelfare.com/pfds/IRB_Concussion_Guidelines_EN.pdf
- Acquired Brain Injury Care Pathway: Neurorehabilitation (2011)
- www.hscboard.hscni.net/RABIIG/Acquired%20Brain%20Injury%20Pathways/Acquired%20Brain%20Injury%20Inpatient%20Care%20Pathway%20Neurorehabilitation%20-%20PDF%201MB.pdf

