HEAD TRAUMA

Decerebrate
Decorticate posture

Monroe's Doctrine
Cushing's triad
↳ Resp irregularity
↳ Hypertension
↳ Bradycardia

ANATOMY

SCALP

S - Skin
C - Connective tissue ⇒ consists of fibrous septa; the walls of blood vessels are adherent to them. So on laceration, they bleed due to inability to retract.
A - Aponeurosis
L - Loose Areolar tissue
P - Periosteum

Scalp laceration
↳ Emg. ⇒ pressure
↳ Dy ⇒ Suture ⇒ No.1 / 1-0 / 2-0
Cutting or Reverse cutting needle

Aponeurotic layer - if there is bleeding below aponeurotic layer → Black Eye.

Loose areolar tissue → Emissary Veins → Retrograde spread ↓ Cavernous sinus thrombosis

Periosteum

Skull fractures:-

- Non-depressed ↓ Conservatively
- depressed
  - In: NCCT (IOC)
  - Mn: Surgical elevation & fixation ↓ only if any of it is present
    - ↓ focal neurological signs (+)
    - ↓ depression more than adjacent skull thickness

NOTE:- NCCT is the IOC for head injuries.

Base of skull fractures :-

Ant Vs. Middle Vs. Posterior cranial fossa fractures :

	Ant.	Middle	Posterior
fracture of	cribriform plate	petrous part of temporal bone	occipital bone
CF	1.) Bil Black eye / raccon eyes : Post. / Superior border of subconjuctival hemorrhage cannot be seen.	1) Temporal bone contusion	1.) Visual problem
		2.) Battle sign : discoloration over mastoid process. • 24 - 48 hrs after fracture	2.) Occipital contusion
		3.) Hemotympanum	3.) VI th nv. injury
		4.) CSF otorrhea	4) Vernet Syndrome Jugular foramen Syndrome (rare)
		5.) Facial nv. injury	IX - XI th CN injury
		6.) Paradoxical rhinorrhea (rare)	
NOTE :-	Sup / Post. border can be seen in direct trauma to the eye.	Middle ear ↓ CSF into Eustachian tube ↓ Nose	
	2.) CSF rhinorrhea Target / halo sign (+) } diff it from epistaxis B_2 transferrin }		
	3.) Epistaxis		
	4.) Anosmia		
	5.) Frontal lobe contusion		
In	NCCT	NCCT	NCCT
Mx	Rx as open fractures. Prophylactic 3rd gen cephalosporin : to prevent meningitis Do not pack the nose tear (aids growth of bacteria via anaerobic conditions)		

NICE Guidelines : For Head Injury

Rule out cervical spine injury in all patients.

GCS monitoring -

- First 2 hours : every 1/2 hr.
- Next 4 hours : Every 1hr.
- After 6 hours : Every 2hrs

Indication for CT :-

1.) In adults :

Within 1hour :

→ GCS < 13 at any point
→ GCS < 15 at 2 hours
→ Focal neurological deficit
→ Suspected open, depressed or basal skull fracture
→ More than one episode of vomiting
→ Post - traumatic seizure
→ LOC(+)

Within 8hrs :-

Age > 65yrs.

Retrograde amnesia > 30 mins

2.) In children :-

Suspicion of NAI (Non Accidental Injury)
First seizure
GCS < 14 or < 15 : In under - ones
GCS < 15 : 2hrs post injury
Signs of base of skull fracture
- FND
- Bruise, swelling, laceration > 5cm in under ones

3.) Indications to involve a neurosurgeon:

1) GCS ≤ 8
2) Fall in GCS after admission
3) Unexplained confusion > 4hrs
4.) LOC(+), seizure(+) & episode of vomiting focal neurological signs.

BRAIN INJURY :- Dangerous mechanism of injury:

Severity of brain injury

Minor :- GCS 15/15 c̄ no LOC (mild interval)

Mild :- GCS 14/15 c̄ LOC ⊕

Mode : 9-13

Score ≤ 8

⇒ Isolated brain injury or head injury → rarely gives rise to hypotension

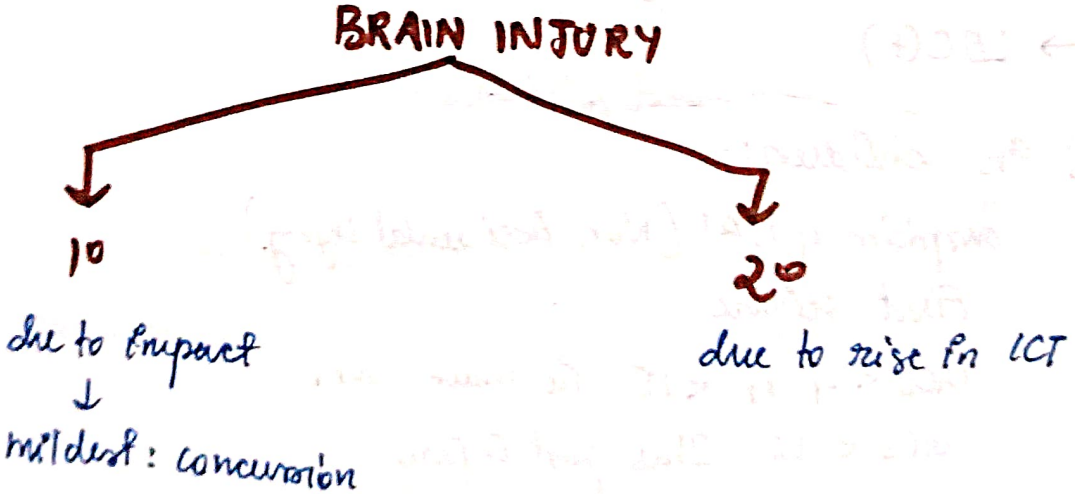
If hypotension +ve in head injury :-

Suspect -

1) Bleeding elsewhere - floor
concealed - thorax, pelvis, ABD, long bones

2.) Associated spinal injury - neurogenic shock

3.) Late stage - Brain herniation



Concussion :-

NCCT - ⊕ Postconcussive Syndrome

Colorado classification

I : confusion

II : amnesia

III : LOC

Advice : avoid contact sports for few days

* Chronic traumatic encephalopathy - repeated trauma leading to personality Δs.

* Diffuse Axonal Injury -

Mech: Shearing force b/w grey & white matter
High velocity injury

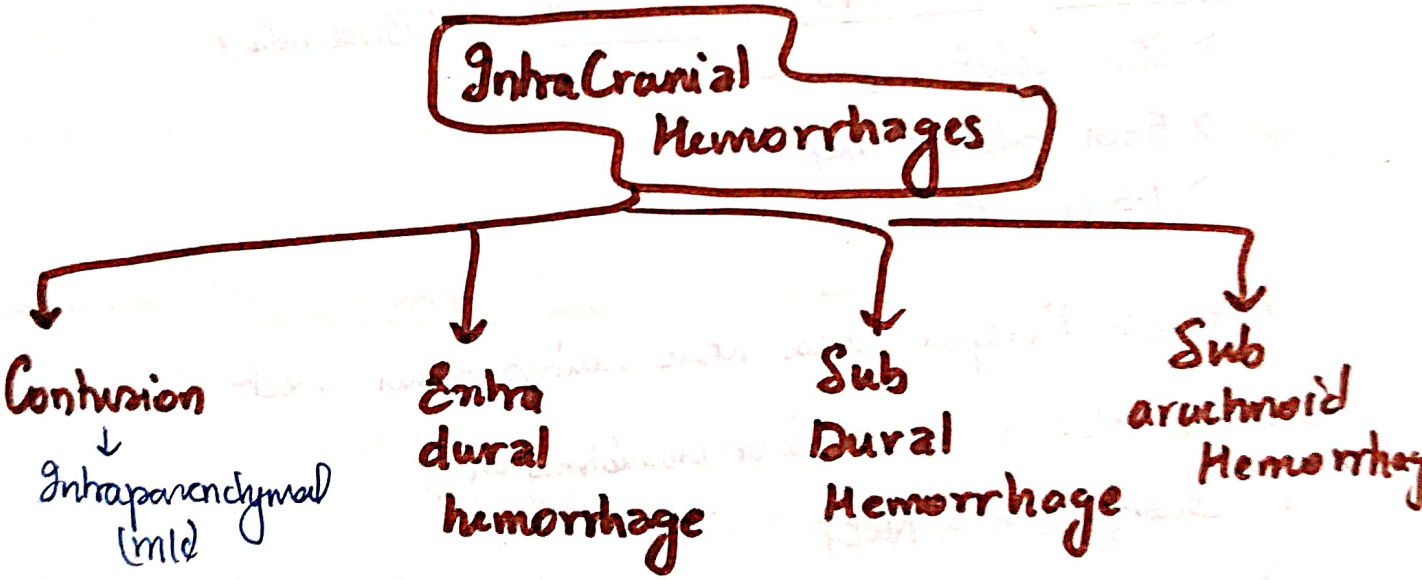
C/F - Coma & GCS will not improve

NCCT - (N)

IOC: MRI - punctate hemorrhages at grey/white matter junction.

HPE: Retraction balls & clubbed axons

Worst prognosis.



I) mle site - temporal > frontal
IOC : NCCT -
↓
come with personality Δs.

Contusion
↓
Majority
resolves with conservative Mx.

Coalesce
↑ in size
↓
evacuation

Mx:- Conservative
Controlling ICT
↑ in size → evacuation

II. Extradural Hge :-

Mech: High velocity impact

Anatomy: Arterial ⇒ M/C - MMA

Features :- Young

Can present c lucid interval

are common but not pathognomic of EDH.

IOC :- NCCT - biconvex or lens shaped hemorrhage.
Restricted by skull & dura & cranial sutures.

Indications for craniotomy in EDH :- (Burr hole)

> 30cc clot size

> 5mm midline shift

> 1.5 cm thickness

Pterion :- Keyhole area where various sutures meet.

⊛ Which side to make hole or craniotomy on?

1. Localize site :- NCCT
2. If NCCT :- N/A ⇒ side of dilated pupil

False Localizing Sign - Kernohan's Notch phenomenon

Ex:- left EDH → left pupil dilated

① ICT - temporal lobe herniation (uncal herniation) → presses on Kernohan's notch on other side (R) (Corticospinal tract)

pt. presents with left hemiparesis

III. SUB DURAL HEMORRHAGE :-

Acute < 3 days
Subacute = 3 - 21 days
Chronic = > 21 days

Mechanism :- Initial Injury
Anatomical :- Venous bleed (bridging veins)
C/F - Elderly pt.
trivial trauma
(N) for few days to weeks ⇒ Altered sensorium
⇒ Concavo convex bleed - crescentic
⇒ bleed is btw dura & arachnoid
⇒ not restricted by sutures

Indications for craniotomy in SDH -> Burrhole
> 1cm thickness
> 5mm midline shift
> 2 points drop in GCS
> ICP > 20mm of Hg
> fixed dilated pupil
} any (2)

IV. Traumatic SAH ⇒ mlc cause - trauma
majority mn - conservatively

2° BRAIN INJURY :-

CPP - Cerebral perfusion pressure = (MAP) - (ICP)↑↑
≥ 60mm of Hg
↓
↑ SBP → ↑ CO = HR X SV↑↑ → End diastolic volume ↓ → ↑ diastolic
↓ HR ← ↑ diastolic

↑ SBP
↓ HR
Altered sensorium
} Cushing Reflex

Cushing ulcer → stress ulcer
head injury
acid producing area

Management of raised ICT:

1.) Adequate oxygen
2.) Adequate perfusion: SBP >100mm Hg (to ensure adequate CPP)
3.) Avoid hyperglycemia → can worsen cerebral edema. (Avoid dextrose)
4.) IV mannitol - osmotic (CI - pneumocephalus & EDH)
5.) Hyperventilation - only in moderate amounts

* No role of steroids
If raised ICT due to tumor - Steroids ✓

Seizure prophylaxis:-

Prophylactic use of phenytoin or valproate is not recommended for prevention of PTS.

DISCHARGE:

NICE discharge criteria :-
GCS 15/15 with no FND.
Normal CT brain if indicated.
Pt. not under influence of alcohol or drugs
Pt. accompanied by a responsible adult.
Verbal & written head injury advice.

Seek Medical attention if:-

Persistent/worsening headache despite analgesia
Persistent vomiting
drowsiness
Visual disturbance
Limb weakness

GLASGLOW OUTCOME SCORE:

1. Death
2. Persistent vegetative state
3. Severe disability
4. Moderate disability
5. Good recovery

BRAIN DEATH :-

→ Certified by 2 experts.

→ Can be declared only if there is no possibility for recovery of brain function.

→ Criteria :- 1) GCS ≤ 3
2) Non reactive pupils
3) Absent brainstem reflexes
4) No spontaneous ventilatory effort
5) Absence of confounding factors — Alcohol / drug / hypothermia

Ancillary studies like EEG, cerebral angiography are also used.