Nottingham University Hospitals NHS
NHS Trust

Neuro-Trauma

Mr Alex Leggate

Grace Darr

Traumatic Brain Injury

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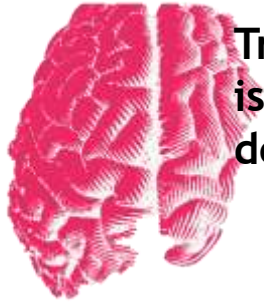


Traumatic Brain Injury is the leading cause of death and disability in people >40year old in the UK

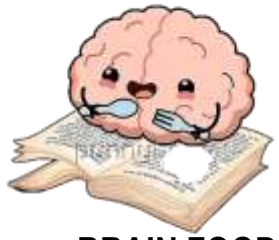
In the U.K, someone is admitted to hospitals with a TBI every 3 minutes.

That is 427+ admissions per day

In the U.K men are 1.5x more likely than females to be admitted with a TBI

The most common cause of TBI in the U.K is **falls**

Up to 60% of people with TBI are unable to return to work 1-2years post injury



BRAIN FOOD

The Neuro-Trauma service offers a multi-disciplinary approach to caring for patients

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Neuro-Trauma Service

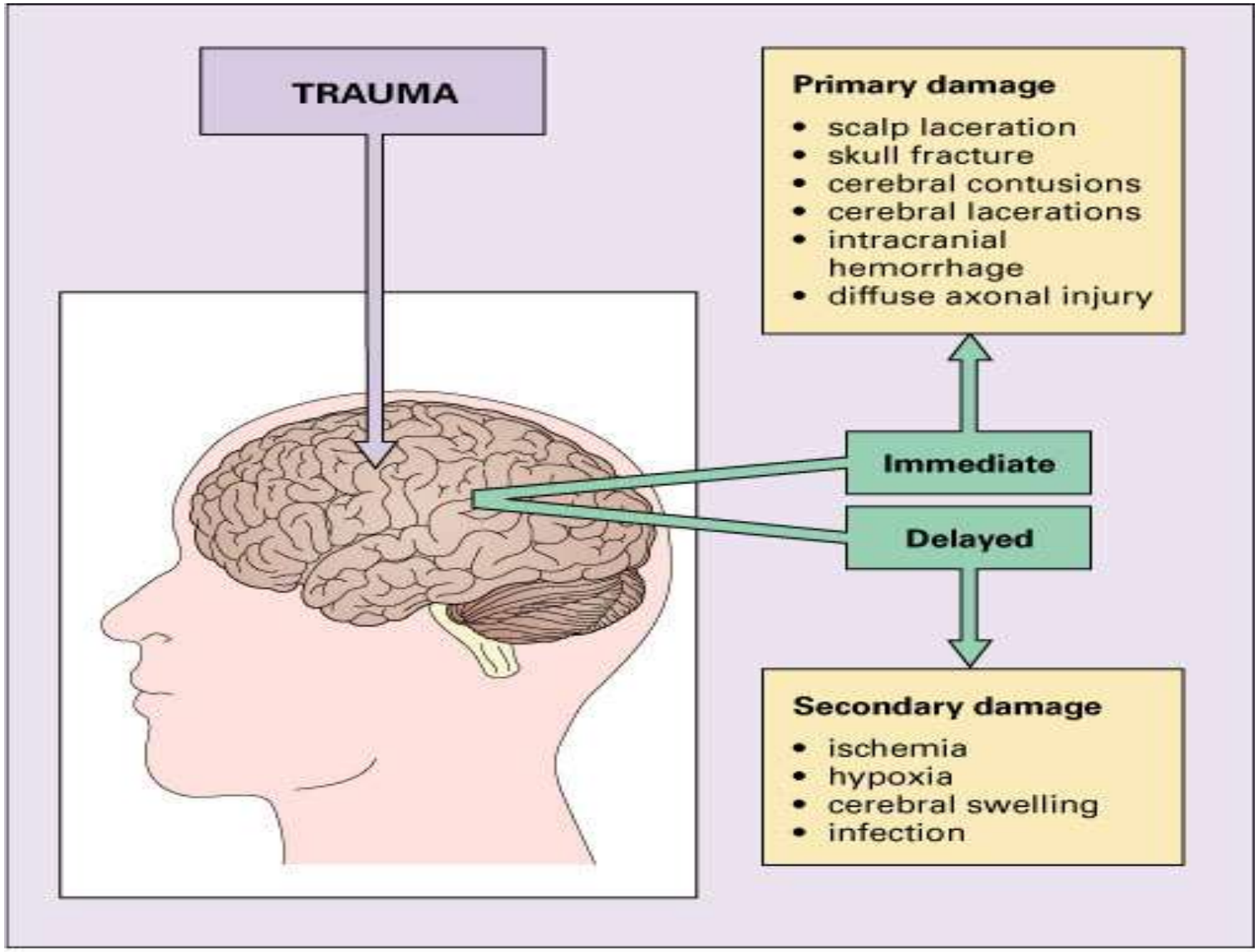
Service started with weekly ward round reviews		Nurse-led face to face appointments		Employed second WTE	CNS can order CTH and Prescribe	MAST involvement	Physiotherapist starting as Specialist Practitioner
March 2020	First MDT	First nurse-led telephone follow up clinic	Dec 2020 – First post-TBI hypopituitary clinic (nurse-led)	Presented at SBNS Conference	SOP and Audit		October 2023

823 patients April 2022-March 2023

An increase of 92% from 2020-2021

Through compassion, to offer our patients the empowerment to improve their quality of life by supporting their clinical and therapeutic outcome. We will do this through holistic and inclusive MDT meets, walking alongside our patients and their loved ones through their journey from admission to beyond discharge.

What are the different types of traumati brain injury (TBI) and why are they important?



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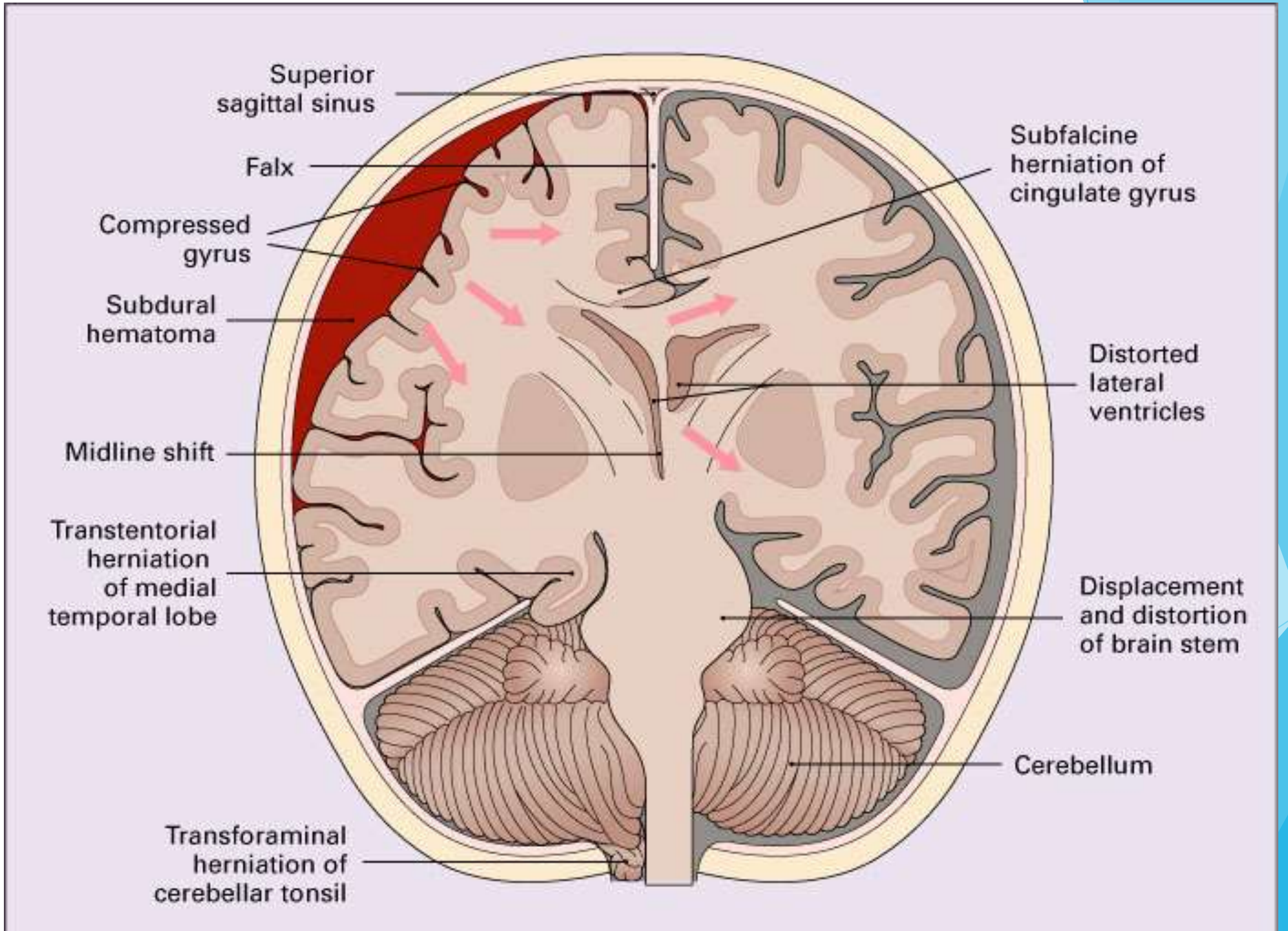
What does the on call neurosurgeon really want to know?
Why do they make a particular decision?

- Baseline functional state & frailty
- PMH
- Brief history of events
- Does the patient take blood thinners? Is coag normal? Do they have decompensated alcoholic liver disease?
- GCS
- Pupillary size and reactivity
- Focal neurological deficits
- Scan findings
- Any pre-existing wishes, advanced directives etc

Decision making process

- Is surgery required immediately?
- Might surgery be required in the future?
  - If so, what is the likely time frame?
- Is surgery likely to give the patient a better or worse outcome given their age and background history?
- Does the patient have the potential to deteriorate and would they be better managed in a neurosciences unit?
  - If they were transferred to a neurosurgical unit, what will be done differently for the patient?
- What other injuries do they have and what takes priority?

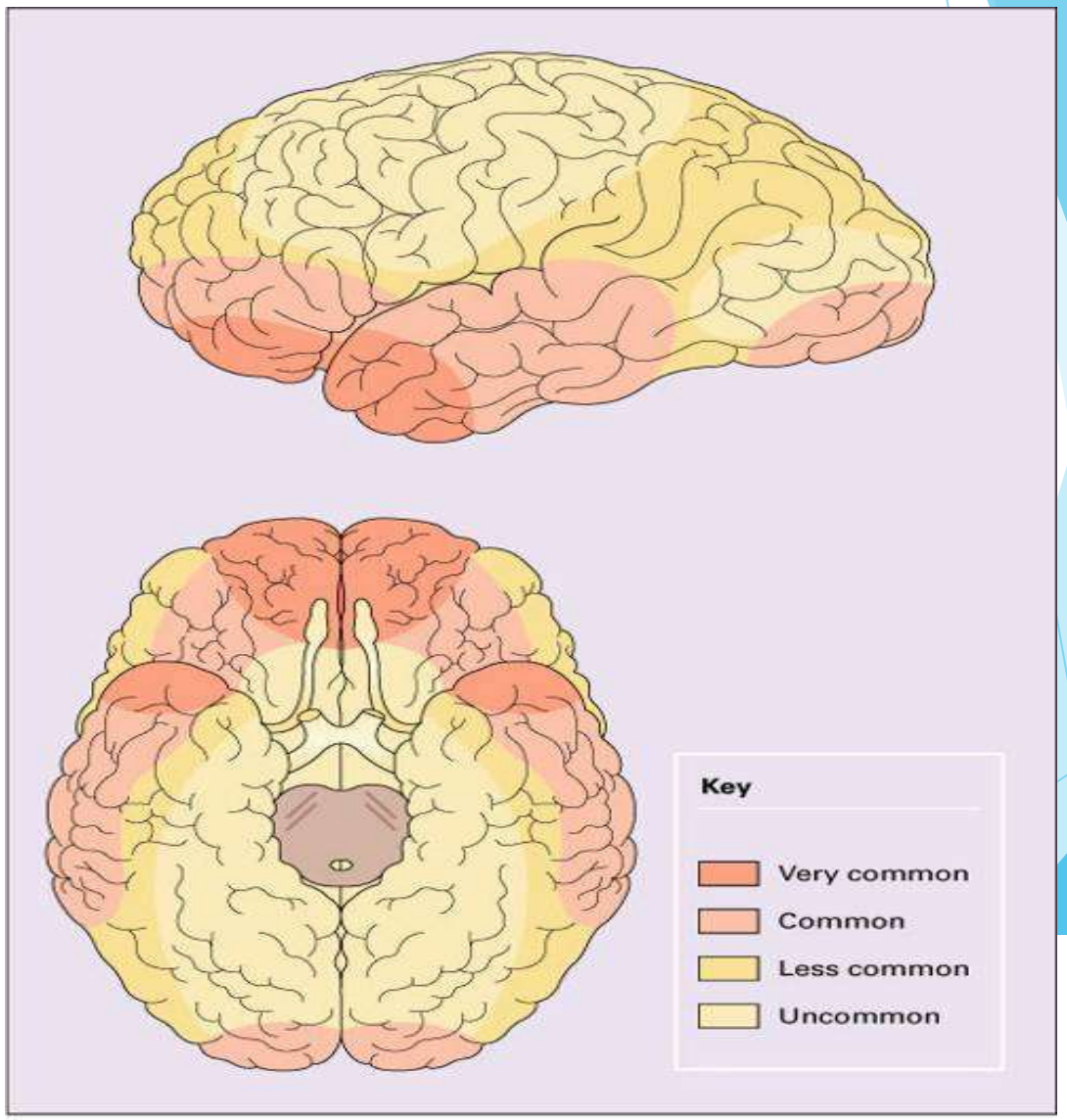

Superior sagittal sinus
Falx
Compressed gyrus
Subdural hematoma
Midline shift
Transtentorial herniation of medial temporal lobe
Transforaminal herniation of cerebellar tonsil
Subfalcine herniation of cingulate gyrus
Distorted lateral ventricles
Displacement and distortion of brain stem
Cerebellum

- CT – convex ‘lenticular’
- Midline shift and brain compression
- Neurosurgical emergency if large

- Concave collection
- Varying density
- Midline shift and brain compression

sions

- Commonest where brain impacts on base of skull



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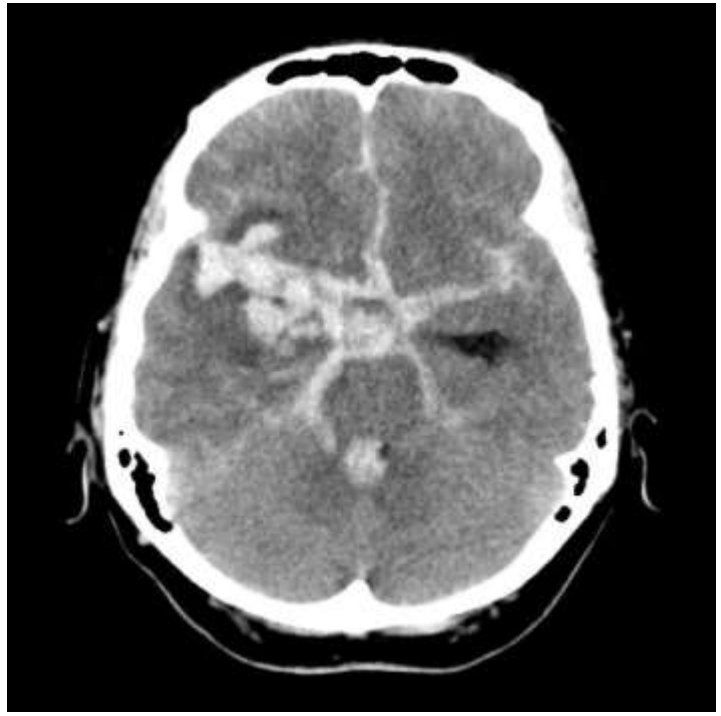
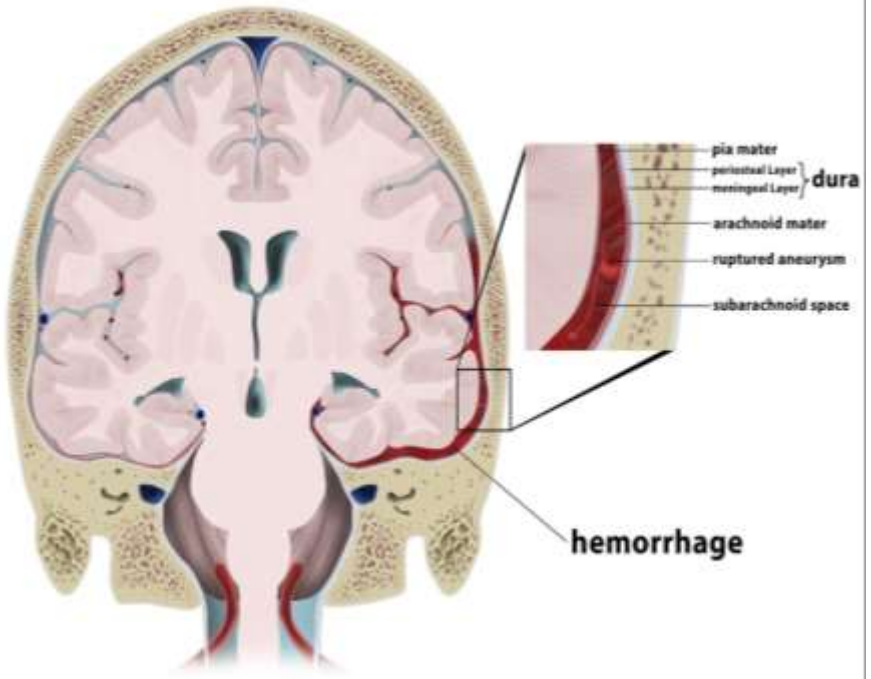




Subarachnoid Haemorrhage

- Bleed into subarachnoid space
- Trauma – most common cause

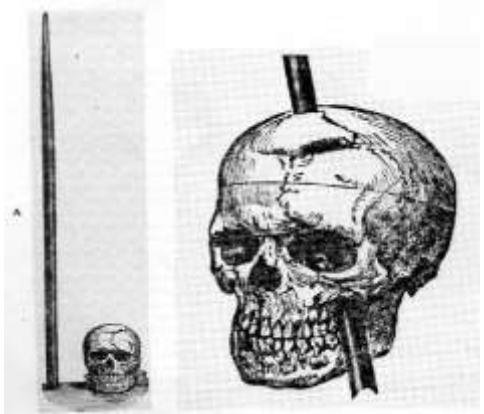
DAI Imaging

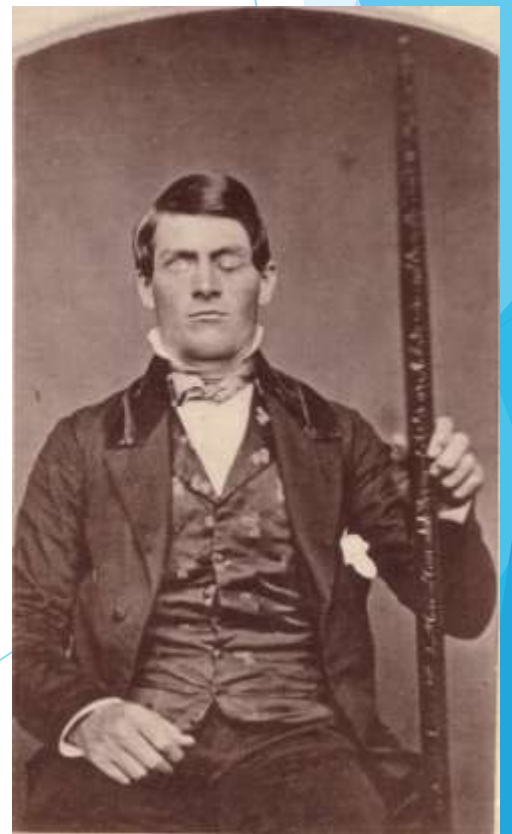
- CT may be “NAD”
- MRI will show microhaemorrhages (SWI/GE) and swelling
- Patient may be much worse clinically than imaging suggests
- Various grading systems for DAI
  - Durettes haemorrhage midbrain poor prognostic sign

Penetrating Head Injury

- Rarer in UK, but common in US
- Injury depends on kinetic energy of projectile

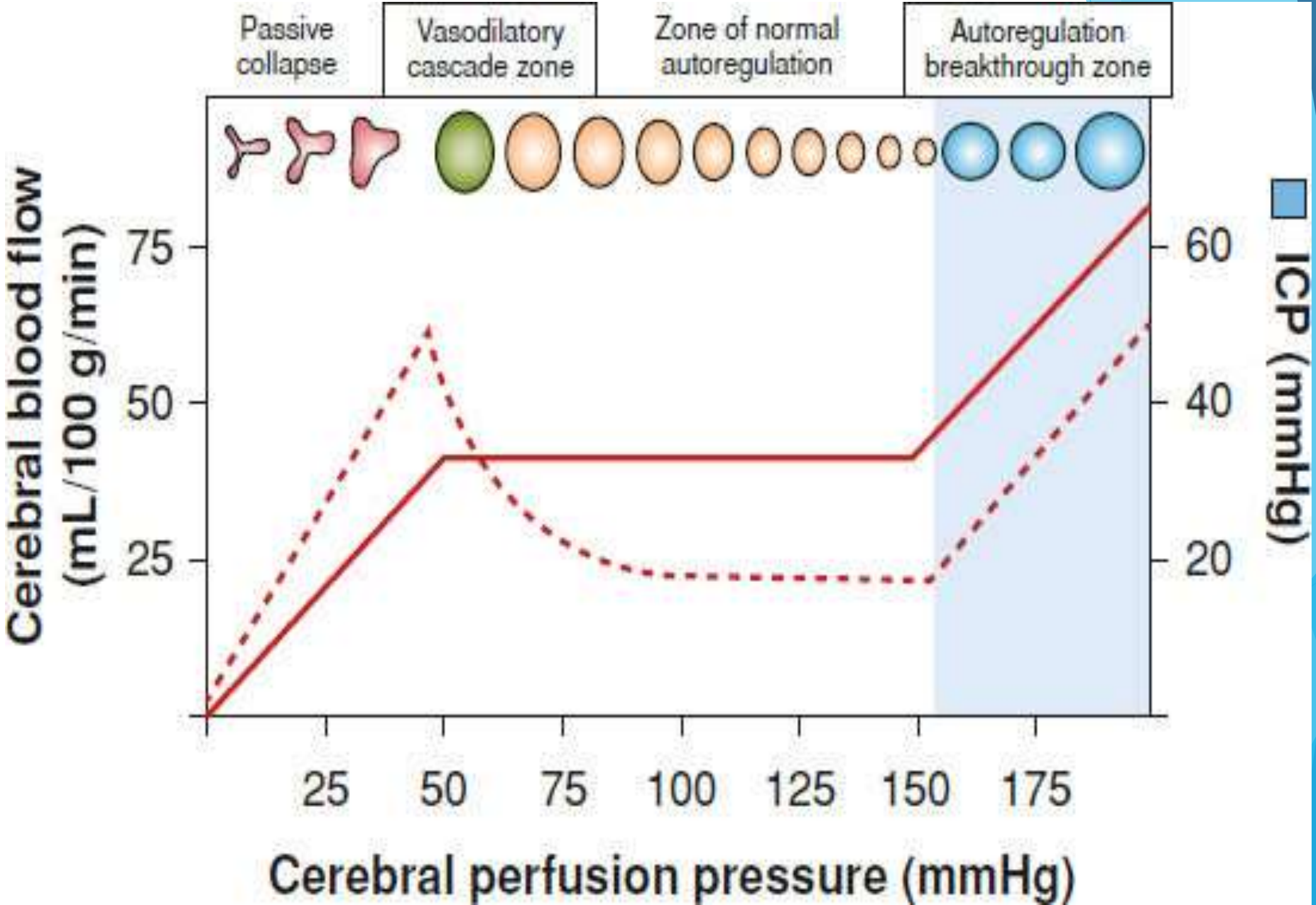
- High velocity injuries that penetrate brain are rarely survivable – shock wave causes massive axonal disruption





Increased Intracranial Pressure

- **Monro-Kellie hypothesis:** because of limited space in the skull, an increase in any one skull component—brain tissue, blood, or CSF—necessitates a change in the volume of another
- Compensation to maintain a normal ICP of 10 to 20 mm Hg is normally accomplished by shifting or displacing CSF
- With disease or injury, ICP may increase
- Increased ICP decreases cerebral perfusion, causes ischemia, cell death, and (further) edema


Passive collapse
Vasodilatory cascade zone
Zone of normal autoregulation
Autoregulation breakthrough zone
Cerebral blood flow (mL/100 g/min)
75
50
25
60
40
20
ICP (mmHg)
25
50
75
100
125
150
175
Cerebral perfusion pressure (mmHg)

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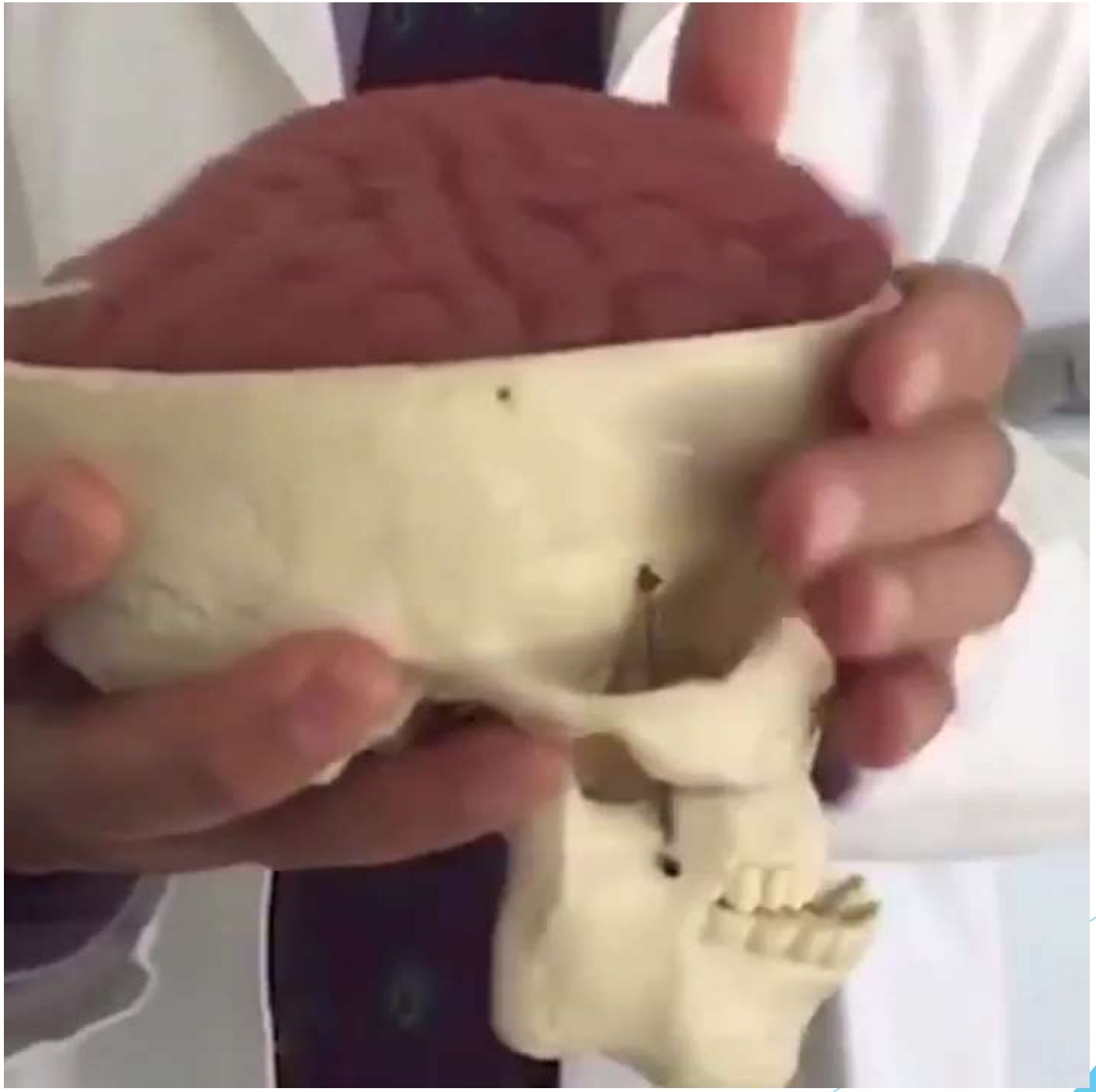
Case Study

- November 2021 – referred from local hospital (KMH)
- 30M Assault – punched in the face and fell hitting the back of his head
- PMH: ETOH, otherwise fit and well.
- E3V3M6 at scene
- Injury – Bifrontal and right parietal contusions. Right temporo-parietal Subdural Haematoma. Tentorial and parafalcine Subdural Haematoma. Right occipital skull fracture extending to the base of skull. Right temporo-parietal skull fracture.

- Admitted to neurosurgical ward. Dropped GCS (E2V2M5) and became agitated and combative → intubated and ventilated

- ICP bolt.

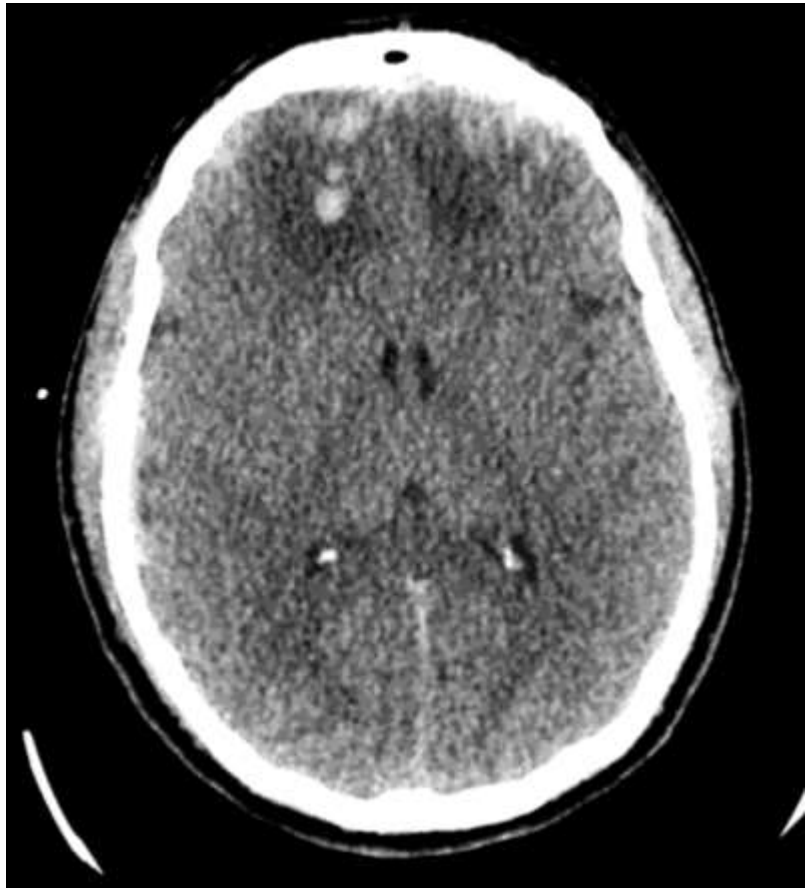
Day 1



Day 2

ICP 15
Propofol+Alfentanil

Day 4

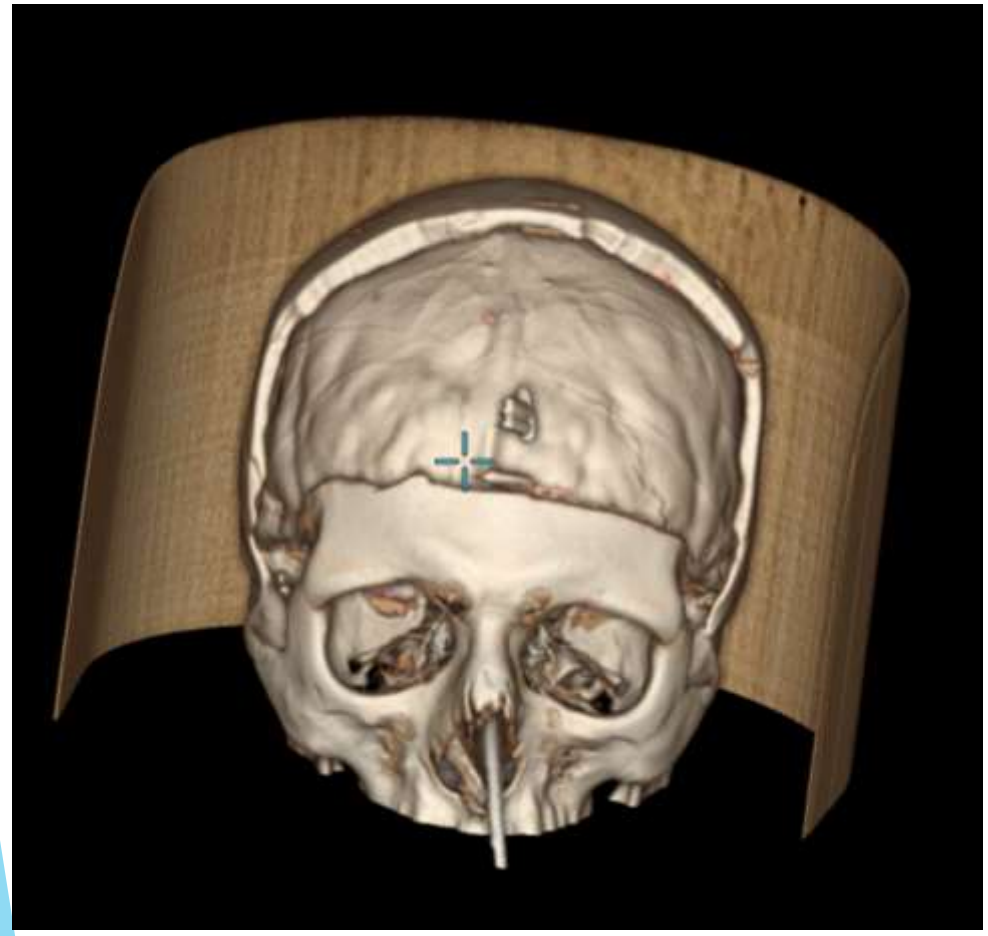


ICP 20-25
PEARL
On Double strength Morphine+Midazolam+Propofol
Commenced on Prophylactic Levetiracetam

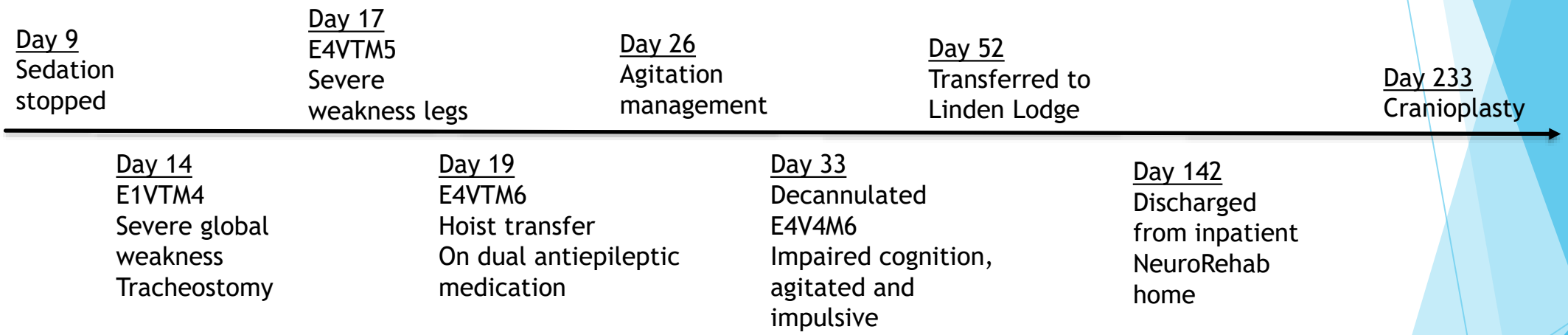
Day 6

ICP 25-30
Pupils 3+bilaterally but sluggish to react
On Double strength Morphine+Midazolam+Propofol +Rocuronium+Thiopentine
Commenced on Prophylactic Levetiracetam
Hypertonic Saline

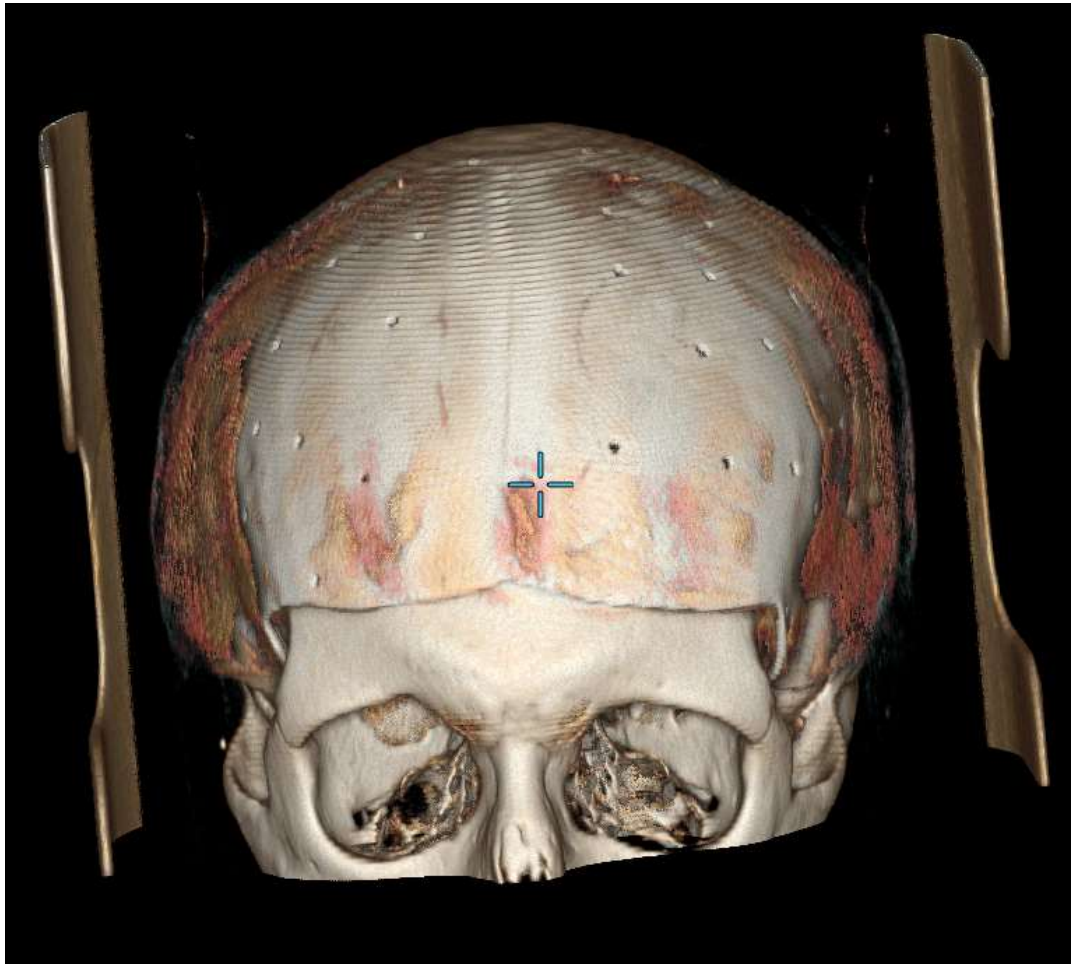
Day 7

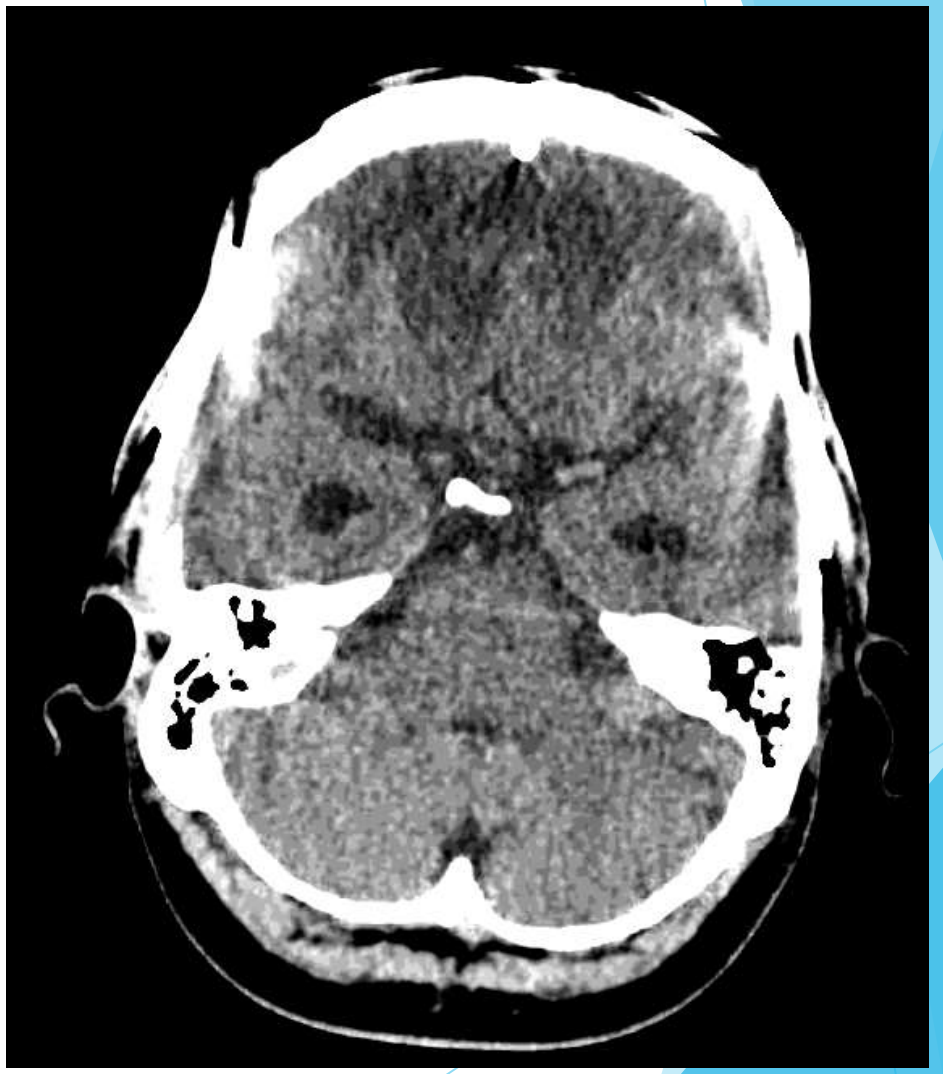


Bifrontal Decompressive Craniectomy


Day 9
Sedation stopped
Day 14
E1VTM4
Severe global weakness
Tracheostomy
Day 17
E4VTM5
Severe weakness legs
Day 19
E4VTM6
Hoist transfer
On dual antiepileptic medication
Day 26
Agitation management
Day 33
Decannulated
E4V4M6
Impaired cognition, agitated and impulsive
Day 52
Transferred to Linden Lodge
Day 142
Discharged from inpatient NeuroRehab home
Day 233
Cranioplasty

D23





Day 261
Seizures with
Neurology input

Day 341
Diagnosed Post-TBI
Hypopituitarism

Day 459
Suicide attempt and
changes to antiepileptic
medication accordingly

Day 528
Much stable mood.
Feels more positive and
engaging in Neuro-Rehab.

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Questions

- Mr Alex Leggate

Lead Neuro-Trauma Neurosurgical Consultant

alex.leggate@nuh.nhs.uk

- Grace Darr

Lead Neuro-Trauma CNS

grace.darr@nuh.nhs.uk

- Lisa Martin

Neuro-Trauma Specialist Practitioner

Lisa.martin2@nuh.nhs.uk