

MUNRO KELLIE DOCTRINE

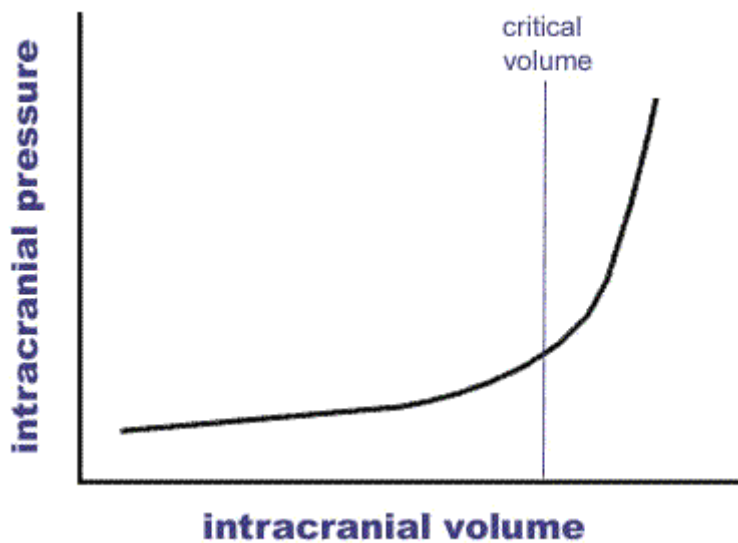
The skull is a fixed space that contains:

- Brain
- Blood
- CSF

If the volume of one of these components increases, then another must decrease to prevent raised ICP.

Normal ICP = 5-15 mmHg

This intracranial pressure (ICP) rise can lead to interruption of cerebral blood flow by reducing the cerebral perfusion pressure. As an intracranial mass lesion or oedematous brain expands, some compensation is possible as CSF and blood move into the spinal canal and extracranial vasculature respectively. Beyond this point, further compensation is impossible and ICP rises dramatically. This is demonstrated below:



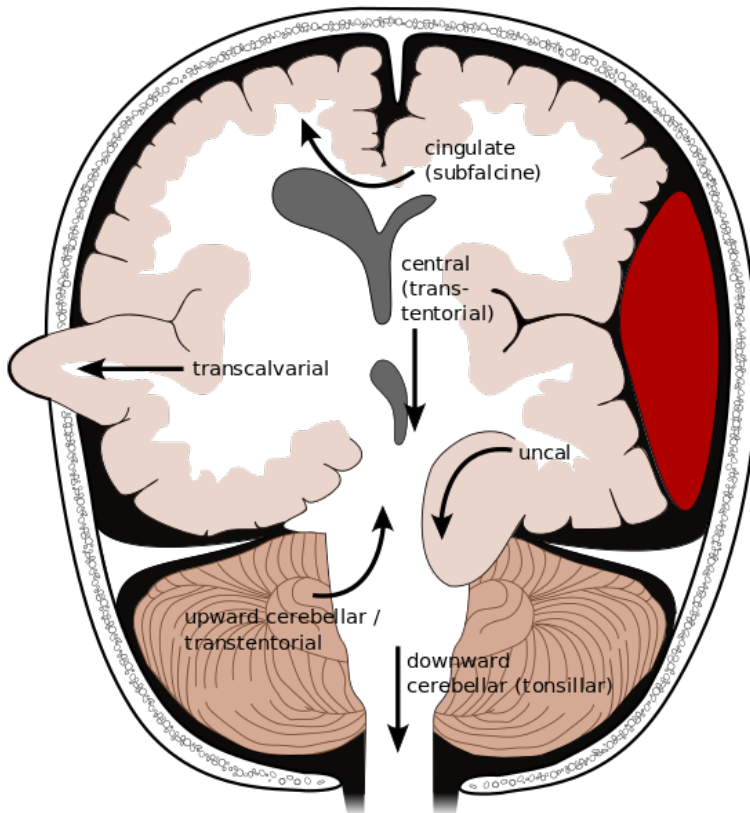
Cerebral Perfusion Pressure = Mean Arterial Pressure (MAP) - ICP

SIGNS OF RAISED ICP

- Cushing's Triad
 - Hypertension
 - Bradycardia
 - Hypoventilation
- Reduced GCS
- Papilloedema
- Pupil dilatation with no light reflex (CN 3&6 palsy)

- Posturing – decerebrate, decorticate
- Headache
- Seizures
- Vomiting
- Focal neurological deficit
- Respiratory arrest

WHAT HAPPENS IN THE BRAIN



TREATMENT OF RAISED ICP

- Elevating head of bed to 30° - improves venous drainage
- Tape ETT
- Oxygenation to ensure PaO₂ > 10 kPa
- Ventilation to maintain PaCO₂ 4.5-5 kPa
- Intubation & ventilation
- Neuromuscular blockade
- Sedation
- Mannitol IV
 - Osmotic Diuretic
 - Dose: 0.25-2g/kg of 20% mannitol over 30 minutes
 - Only administer after neurosurgical advice