Raised intracranial pressure (RICP)

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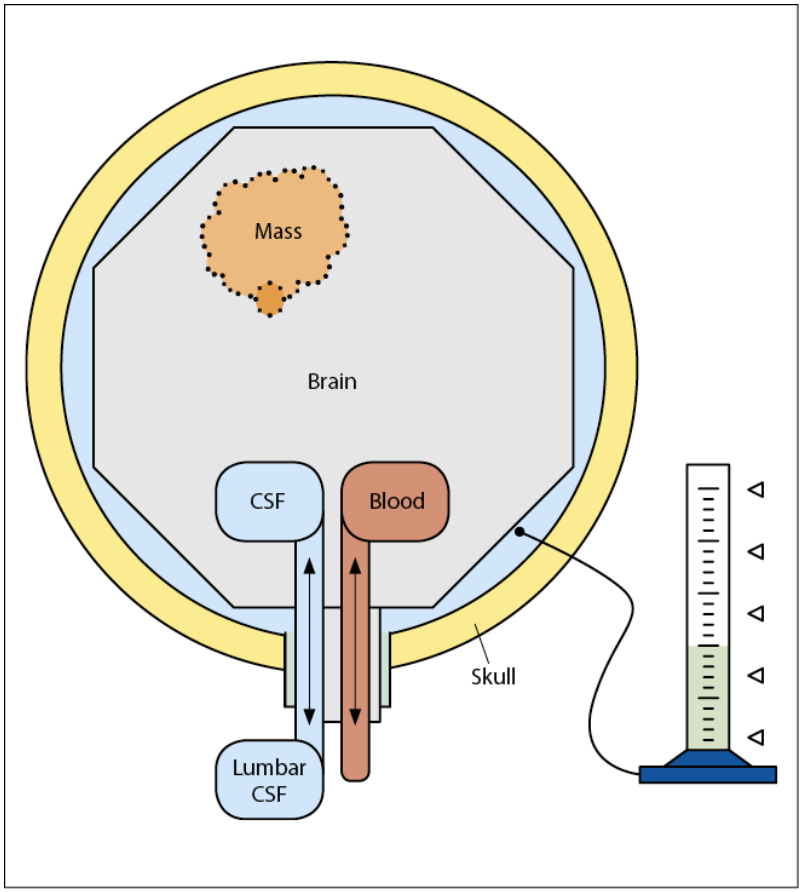
What is raised intracranial pressure (RICP)?

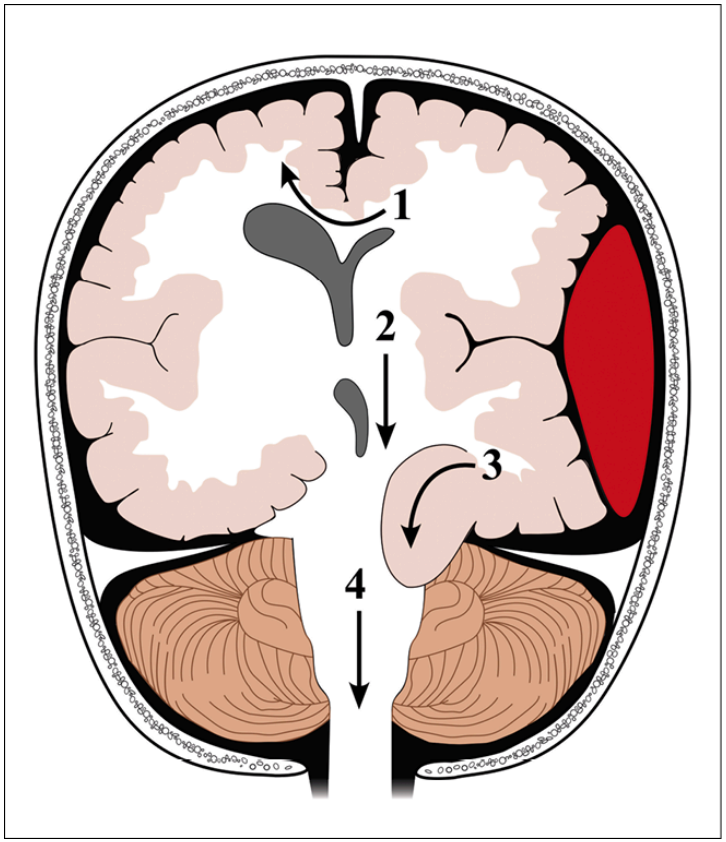


- ICP
- mmHg
- cmH2O=mmHg X 1.36
- >20 - 25 mmHg (5 min)
- The Monro-Kellie doctrine
- Normal values
  - 5 - 10 mmHg (adult)
  - 3 - 7 mmHg (children)
  - 1.5 - 6 mmHg (infant)

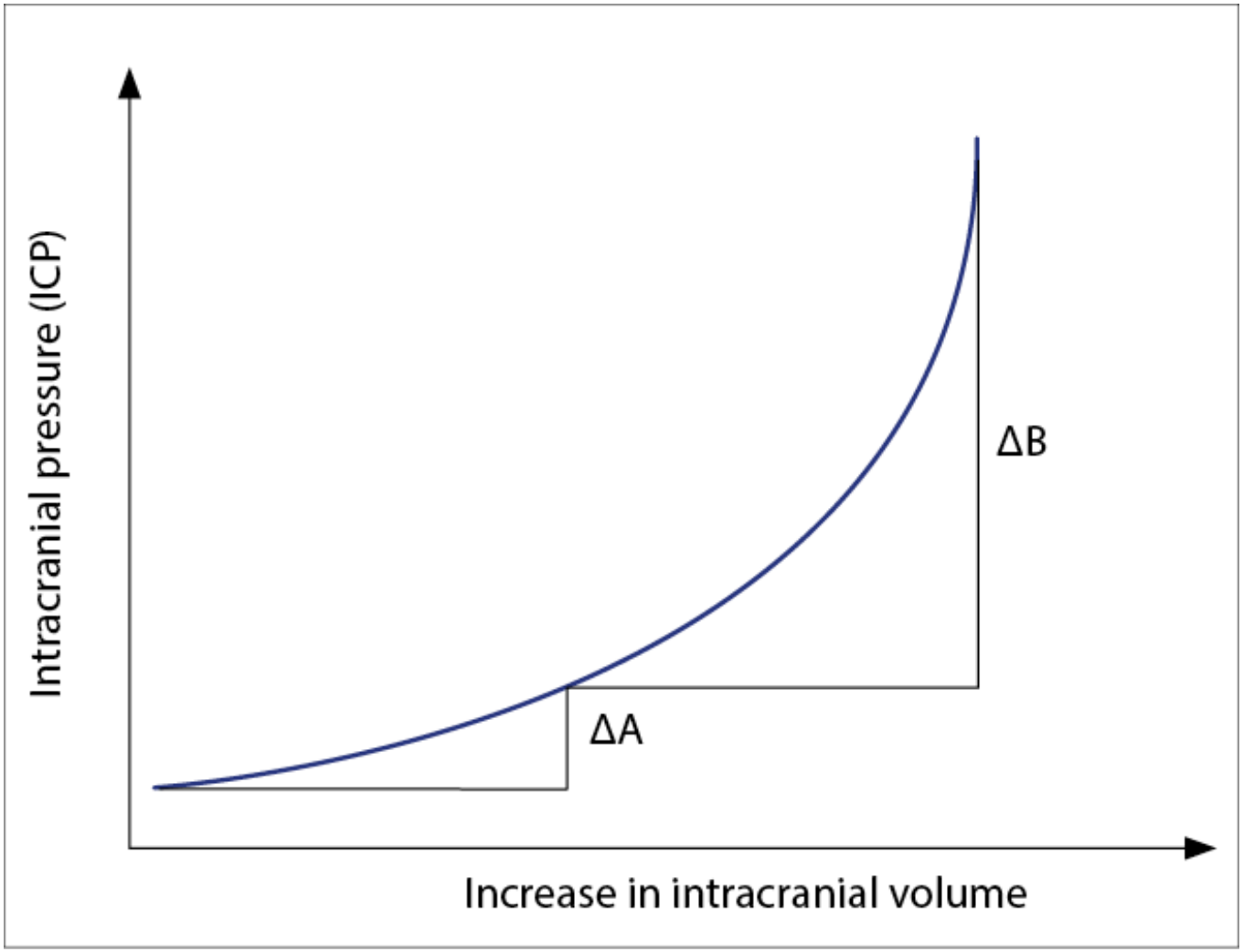
- The Monro-Kellie doctrine

herniation

- Sites of brain herniation
  - 1: subfalcine
  - 2: central
  - 3: uncal (transtentorial)
  - 4: tonsillar



Intracranial compliance curve



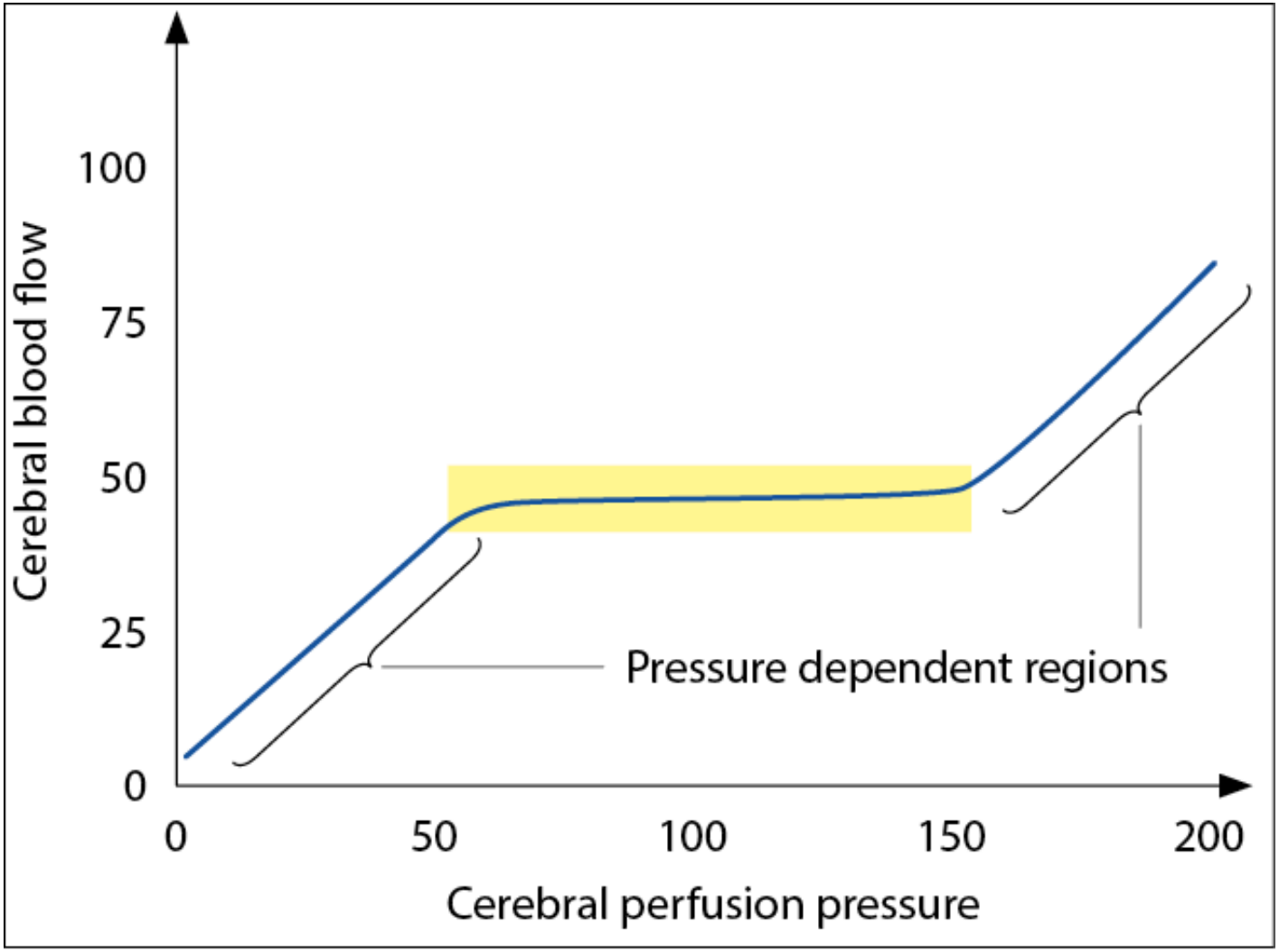
Why is ICP important?

- RICP results in
  - brain shifts
  - brain ischaemia
  - the final common pathway that leads to death
- Cerebral perfusion pressure (CPP)
- CPP = MAP – ICP.

Why is CPP important?

- the main determinant of cerebral blood flow (CBF)
- CBF greater than 50 ml/100 g/min
- CBF<20 ml/100 g/min => ischaemic threshold
- cerebral autoregulation (50 - 150 mmHg)

Cerebral autoregulation



What are the causes of raised ICP?

- Hydrocephalus
- Brain tumour
- CNS infections
- Trauma
- Cerebrovascular
- Metabolic encephalopathy
- Status epilepticus
- Craniocerebral disproportion
- Developmental lesions
- Idiopathic intracranial hypertension

Raised ICP mechanisms

- cerebral oedema (brain tissue)
- vascular (congestive) brain swelling
- hydrocephalus (CSF)
- mass lesion

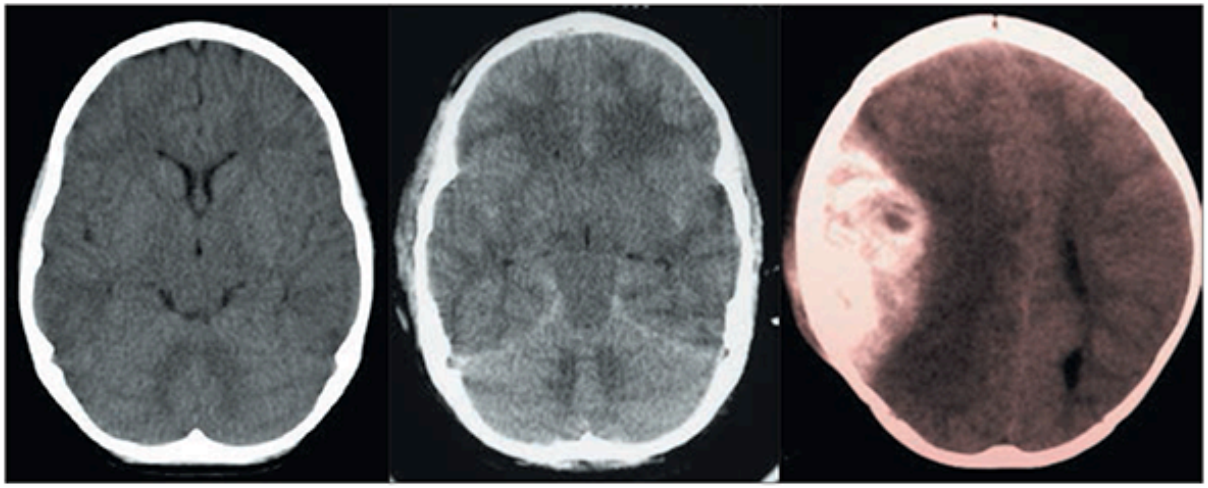
How do I recognise raised ICP?

- History
- Patient's level of consciousness
  - Glasgow Coma Scale (GCS)
- Lumbar puncture FATAL

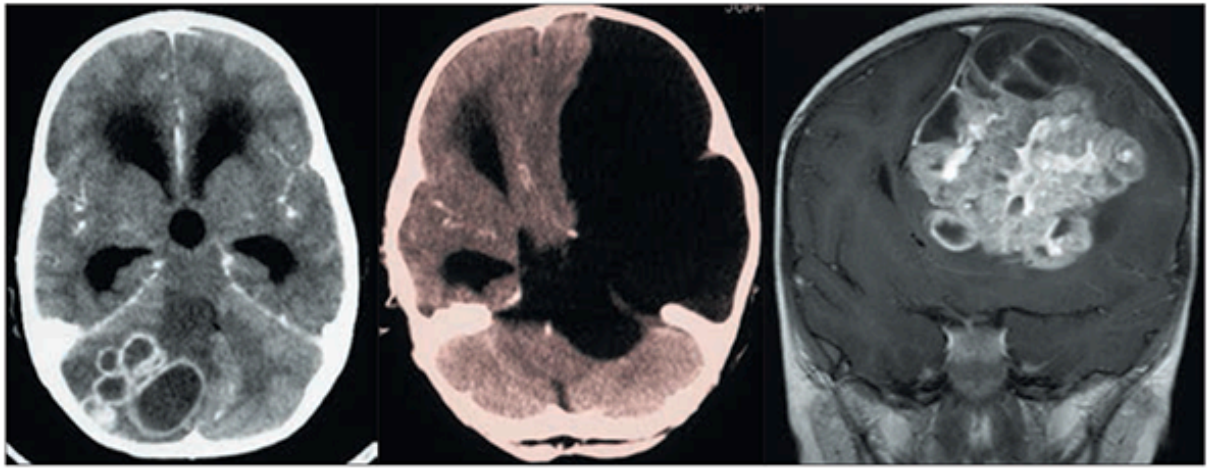
Glasgow Coma Scale

BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	*Best response*	15
	Comatose client	8 or less
	Totally unresponsive	3

intracranial pathology resulting in raised ICP



Normal scan *Swollen brain* *Extradural haematoma*



Multiple abscess *Congenital cyst* *Brain tumour*

RICP SYMPTOMS

- Headache
- Vomiting
- visual disturbances
- Diplopia
- Palsy of the 3rd cranial nerve
- Cushing's triad
  - increased systolic pressure (including widened pulse pressure),
  - Bradycardia
  - irregular breathing
- Brain herniation syndromes

What management should I institute?

- resuscitation
- Imaging
- neurosurgical referral

What is likely to happen next?

- CT/MRI scan
- ICP pressure measure/monitoring
  - maintain ICP less than 20 - 25 mmHg
  - ensure a CPP greater than 60 mmHg (adults)

Medical interventions

- Analgesia, sedation and paralysis
- Hyperosmolar therapy
- Hyperventilation
- Hypothermia
- Steroids

Surgical interventions

- Mass lesion removal
- CSF drainage
- Decompressive craniectomy

SUMMARY

- Raised ICP is a common management problem in neurosurgical and neurological services
- serious and potentially life-threatening emergency
- fast and reliable referral and transfer mechanisms should be established

THANKS