



RAISED ICP & TBI

Protect the brain · perfusion, not just pressure

CPP

60-70

THE ONE EQUATION: $CPP = MAP - ICP$. You can raise perfusion by raising MAP or lowering ICP - the brain only cares about the difference. Treat ICP > 22 mmHg; target CPP 60-70 mmHg.

RECOGNISE RAISED ICP

act before herniation

EARLY

Headache, vomiting, ↓ GCS, restlessness, pupillary asymmetry.

CUSHING TRIAD

Hypertension + BRADYCARDIA + irregular breathing. A LATE, pre-terminal sign.

HERNIATION

Blown pupil, extensor posturing, sudden ↓ GCS ≥ 2 points. Treat NOW, image after.

TIERED MANAGEMENT · SIBICC

start at tier 0, escalate as needed

0

BASELINE - every patient

Head up 30°, neck midline, no tight tube ties. Sedation + analgesia. Normothermia. Normocapnia $PaCO_2$ 35-40. SpO_2 > 94%. Na 135-145, glucose control, treat seizures.

1

FIRST-LINE

Deepen sedation. CSF drainage if EVD. Osmotherapy: hypertonic saline (bolus 3% or 23.4%) OR mannitol 0.25-1 g/kg. Keep CPP 60-70.

2

SECOND-LINE

Neuromuscular blockade. Mild hyperventilation $PaCO_2$ 32-35 (short term only). Consider MAP challenge to test autoregulation.

3

LAST RESORT

Decompressive craniectomy · barbiturate coma (thiopental, EEG burst-suppression) · mild hypothermia 35-36°C. All carry major risk.

OSMOTHERAPY

- **Hypertonic saline** - 3% 250-500 mL or 23.4% 30 mL via central line; preferred if hypotensive
- **Mannitol** - 0.25-1 g/kg; causes diuresis - watch volume depletion and hypotension
- **Monitor** - Na (target 145-155), osmolality < 320, osmolar gap, renal function
- **Stop if** - Na > 155-160, rising osmolar gap, or renal impairment

AVOID

secondary brain injury

- **HYPOTENSION** - a single SBP < 90 doubles mortality. Keep MAP up.
- **HYPOXIA** - SpO_2 < 90%; and routine/prolonged hyperventilation (causes ischaemia)
- Hyponatraemia, hyperglycaemia, fever, seizures - all raise ICP
- Steroids: NO role in TBI (CRASH trial showed harm)

MONITOR & OPERATE: monitor ICP if GCS ≤ 8 with an abnormal CT (or normal CT plus age > 40, posturing, or SBP < 90). EVD both measures AND treats. Urgent neurosurgery for extradural / subdural / large contusion with mass effect - call early, do not wait for deterioration.

NOT ONLY TRAUMA

same principles, different fix

STROKE / ICH

Malignant MCA infarct or large bleed - decompressive craniectomy within 48 h in selected patients. Reverse anticoagulation (see #19).

MASS / ABSCESS

Tumour or abscess with oedema - DEXAMETHASONE works here (unlike TBI). Urgent neurosurgery for drainage.

OTHER

Hydrocephalus (needs EVD), venous sinus thrombosis, acute liver failure (#54), CNS infection (#22).

SEIZURES & PROGNOSIS: give levetiracetam or phenytoin for 7 days after severe TBI to prevent EARLY seizures (no benefit beyond that). Do NOT prognosticate in the first 72 h - sedation, hypothermia and evolving injury all confound; involve the family early and revisit as the picture clarifies.

PEARLS & PITFALLS

- Perfusion is the goal, not the number - a normal ICP with a low MAP still starves the brain.
- Hyperventilation buys minutes in herniation only - sustained hypocapnia causes ischaemic injury.
- One episode of hypotension or hypoxia can undo everything else you do; guard MAP and SpO_2 obsessively.
- Cushing's triad is a late sign. Treat the blown pupil and dropping GCS, don't wait for bradycardia.

