

NEUROSURGICAL PATIENTS

Common Neurosurgical Patients you may encounter:

- Head injury
- Subarachnoid haemorrhage
- Intracerebral haemorrhage
- Elective postoperative patients

Head Injury

Types seen (often get a mixture):

- Extradural haematoma
- Subdural haematoma
- Contusion
- Diffuse axonal injury
- Traumatic SAH
- Cerebral oedema

Management of Increased Intracranial Pressure

(Cerebral perfusion pressure = MAP - ICP)

Aim for CPP > 70mmHg in head injury patients

Intracranial hypertension = ICP > 20mmHg (Brain Trauma Foundation)

Physical methods

- 20-30° head up tilt (if no contraindication)
- maintain PaCO₂ at 3.5-4.5kPa (should not be used chronically)
- maintain hypothermia, avoid shivering when cooling patient (paralysis may be necessary)

Pharmacological

- sedation, avoid agitation (commonly used neurosurgical sedation in the ICU: morphine/midazolam or propofol – titrate to effect)
- mannitol 0.5-1mg/kg 20% bolus then 0.25mg/kg Q4-6H (monitor Na and osmolarity, keep osmolarity < 320mOsm/L)
dexamethasone 4mg Q6H for vasogenic oedema
- thiopentone coma (loading dose then infusion, EEG monitoring is desirable – aim for burst suppression seen on EEG or Burst Suppression ratio of > 80)

Surgical means

- CSF drainage
- Decompressive craniectomy

Urgent CT scan may be necessary to rule out surgical lesions e.g. haematoma

Other aspects of care

- Follow ATLS guidelines for trauma management

- General management of ICU patients (nutrition, stress ulcer prophylaxis, DVT prophylaxis – mechanical means)
- Seizure prophylaxis – Phenytoin (usually no loading dose unless patient fits – dosage 100 mg q8h IV initially and change to oral when condition stable)
- Infection – include CSF culture and sepsis work up
- Fluid & electrolyte problems – DI (hypernatraemia, polyuria, high serum osmolality, low urine Na and osmolality – treat with DDAVP; cerebral salt wasting (hyponatraemia, polyuria, low serum osmolality, high urine Na and osmolality) – treat with salt and volume replacement)

Subarachnoid Bleeding

- Diagnosis
 - History of severe headache preceding collapse
 - Medical risks eg pre-existing hypertension (20% patients), polycystic kidney, family history, connective tissue diseases
 - Clinically – nuchal rigidity, any grade of altered conscious state, seizures, retinal haemorrhages
 - CT brain – look for subarachnoid blood; may see area of haematoma where aneurysm ruptured; look for acute hydrocephalus (common due to ventricular outflow obstruction by blood clot)
 - CT angiogram – 3D reconstruction looking for cerebral aneurysm
 - DSA – digital subtraction angiography
- SAH grading used in this ICU (in descending order)
 - Hunt Hess (I – V)
 - WFNS (I-V)
- Initial management – general measures
 - ABCs
 - Control seizures if occur
 - OT for drainage of hydrocephalus, ICP insertion, +/- clipping of aneurysm if obviously identified
- Watch out for neurological complications:
 1. Rebleeding
 - before clipping/embolization – avoid hypertension as patient may rebleed
 - (use beta-blockers/ alpha-beta blocker eg labetalol as antihypertensive agent unless contraindication)
 2. Seizures
 - Prophylaxis – Sodium valproate (dose 400 mg q8h IV initially, change to oral when condition stable)
 3. Hydrocephalus (esp if ICP catheter blocked)
 4. Cerebral vasospasm

Most commonly occurs 4-14 days after initial bleed

Diagnose from i) clinical examination: decrease GCS with obvious reversible factors on CT brain; ii) transcranial Doppler ultrasound (usually performed by neurosurgeons); iii) cerebral angiography

For prophylaxis against vasospasm - IV nimodipine (0.2mg/ml 1-2mg/hr)

For established vasospasm – i) HHH therapy (haemodilution, hypervolaemia, hypertension); ii) cerebral angiography and angioplasty

- Definitive treatment for aneurysm surgical (early v.s. late clipping) vs. angiographic embolization

Intracerebral haemorrhage

- Aetiology – underlying hypertension commonest. Others include AVM, anticoagulation, haemorrhagic transformation after ischaemic stroke, tumors, vasculitis, drug abuse
- Investigation – CT brain, angiography (MRI is an infrequent investigation for our neurosurgical patients as our MRI suite not set up for ventilated patients)
- Management
 - Support resp and CVS
 - Neurosurgical intervention – evacuation of clot, ICP monitoring, excision of AVM
 - Angiography and embolization of AVM
 - Management of intracranial hypertension – see above
 - Seizure prophylaxis (phenytoin 100 mg q8h)
- Blood pressure control
 - Very important if aetiology is due to hypertension to prevent rebleed
 - What is the optimal blood pressure? Our neurosurgeons prefer to keep SBP within a narrow range of 140 - 160 mmHg, CPP >70 mmHg
- Antihypertensive agents
 - Beta-blockers preferred
 - Labetalol is our choice
 - Others include esmolol, metoprolol

Post-operative neurosurgical patients

- Most of our elective neurosurgical cases will come from OT extubated, awake and stable. ICU admission is mainly for close neuro-observation in the likely event of deterioration and your job is to admit them and then discharge them the next morning (or even earlier). For those patients who are yet to be extubated but stable, allow to wake up, wean and extubate according to patient condition
- Occasionally there may be a patient that is unstable or became unstable in their ICU stay

- Massive bleeding encountered intra-operatively, coagulopathy
- Stroke (eg need to clamp vessel as a result of uncontrollable bleeding)
- Raised intracranial pressure
- Sudden decrease GCS – may need reintubation, urgently inform neurosurgeon and organize an urgent CT scan. Causes: bleeding into operative site, cerebral oedema, hydrocephalus, blocked ICP
- Seizures