Craniotomy Cheat Sheet

Setup Checklist

☐ Bite block, esoph temp probe, tegaderm for eyes + pink tape
☐ ETT elbow extender
☐ Sed-line
EKG monitors positioned for bed rotation

☐ PIV x2
☐ Art-line

☐ Isotonic bolus fluid (NS/PlasmaLyte)
☐ Carrier fluid
☐ Prop gtt
☐ Sufenta vs remi vs IV opioid bolus
☐ Neo gtt
☐ Cardene gtt and boluses
☐ "Neuro box" – mannitol, decadron, levetiracetam, furosemide

Case Progression

Preop	Neurologic exam, review head imaging ☐ T/S
Access	2nd IV, arterial line
Position	Prepare for bed rotation after induction
Induction	Propofol/rocuronium, maintain SBP 90-140 mm Hg
Post-induction	Tegaderm over eyes Sedation bolus prior to Mayfield pins
Anesthesia Maintenance	Propofol TIVA or partial TIVA
Analgesia	Sufentanil gtt vs remifentanil gtt vs IV opioid boluses
Intraoperative Considerations	• Pre-incision levetiracetam for supratentorial craniotomies • Discuss **agents to decrease ICP** and optimize exposure with surgeon (mannitol, furosemide, dexamethasone, etc.) • SBP 90-140 mm Hg, cerebral perfusion pressure 60-70 mm Hg • Avoid **secondary brain injury** • Monitor for **venous air embolism**
Emergence	• Nicardipine bolus or gtt for SBP < 140 • Avoid long acting sedatives to ensure post-emergence neuro exam

Intracranial Pressure Management

"Brain relaxation" to ↓ ICP and optimize surgical field
- Mannitol – *rapid onset*
- Lasix (decreases CSF production)
- Decadron (vasogenic tumor-related ONLY)

Inhaled anesthetic vs TIVA
- >1 MAC gas: increased CBF, increased ICP
- ≤1 MAC gas = Minimal ↑ ICP with hyperventilation

Hyperventilation
- $PaCO_2$ ~ 30

Cerebral Edema
- Na > 140 (isotonic effect)

Hemodynamic Goals

- Cerebral perfusion pressure 60-70 m Hg (cerebral blood supply)
- SBP < 140 (supports hemostasis)

Avoid Secondary Brain Injury

Adapted from TBI/stroke literature
- Avoid hypotension
- Avoid hypoxia
- Avoid hyperthermia
- Avoid hyperglycemia

Venous Air Embolism

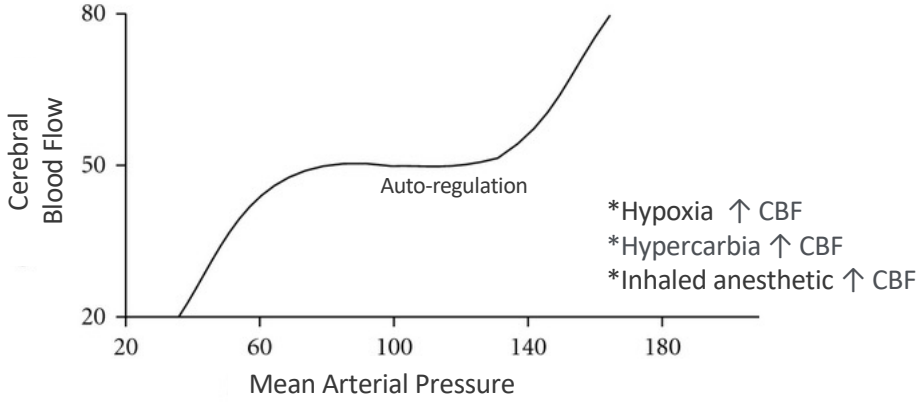
Mechanism: exposed venous sinuses above the heart
Diagnosis: TEE > precordial doppler > $EtCO_2$
Management
1. Flood surgical field, lower head, occlude bilateral IJ veins
2. Supportive care
   - 100% FIO_2
   - Right heart ionotropic support
   - Left lateral decubitus position
3. +/- Aspirate from IJ CVC

Neurophysiology Cheat Sheet

Cerebral Anatomy and Physiology

- Cerebral blood flow = 20% of cardiac output
- Brain's O_2 requirement ~10x higher than rest of body

Cerebral Blood Flow Auto-Regulation



Increased ICP Management

First Line

- **Head up** – increase venous drainage
- **Hyperventilate** – PaCO2 25-30 (risk of hypoperfusion < 25)
  Duration ~ 1-6 hours
- **Osmotic agents**
  - Mannitol: 0.5-1 g/kg – *caution w/ osmolar gap > 20*
  - 3% NS: 150 mL
  - 23% NS: 30 mL – *central access required*
- **Consider TIVA** – avoids "luxury perfusion" from inhaled anesthetic
- Corticosteroids – *tumor-related vasogenic edema only, avoid in TBI*
  - 10 mg dexamethasone

Second Line

- Heavy sedation (↓$CMRO_2$)
- EVD (drains CSF)
- Cooling to ~ 33 C (↓$CMRO_2$)
- Paralysis (↓ cough-associated spikes)

Salvage Therapy

- Decompressive craniectomy

Medications and ICP

Medication	Propofol, Etomidate	Ketamine	Inhaled Anesthetic	Nitrous Oxide	Succinylcholine
Cerebral Metabolic Rate, Cerebral Blood Flow Effect	$CMRO_2$ ↓ CBF ↓	$CMRO_2$ ↑ CBF ↑	$CMRO_2$ ↓ CBF ↑ *CBF no longer coupled with $CMRO_2$*	$CMRO_2$ ↑ CBF ↑	$CMRO_2$ ↑ CBF ↑
ICP Impact	↓ ICP	No impact	*<1 MAC = No ↑ in ICP with hyperventilation* *>1 MAC = ↑ ICP (proven)*	*N_2O + volatile = ↑ ICP* *N_2O + IV anes = stable ICP*	*Slight ↑ ICP, but clinically insignificant*

Opioid Potency Ladder