

Craniotomy for EC-IC Bypass

Purpose: EC-IC Bypass is performed when there is stenosis at the origin of the anterior and/or middle cerebral arteries causing inadequate cerebral blood flow.

Most common etiology: moyamoya disease, atherosclerotic disease, radiation injury.

Length: 6-7 hrs

Anesthetic considerations:

Medications:

- Drips: two Alaris brains: top brain with two syringe pumps for remi +/- propofol, bottom brain with four Alaris channel pumps for carrier, phenylephrine infusion, clevidipine or sodium nitroprusside (**+/- Propofol – if history of PONV)
- Uppers: most commonly neo gtt; also have bolus syringes of neo and ephedrine
- Downers: clevidipine OR sodium nitroprusside (SNP), esmolol; dilute bolus syringes: dilute clevidipine 0.05 mg/ml; dilute SNP to 25-50 mcg/ml
- Preop: Midazolam 2mg
- Induction: Fentanyl (at least 500 mcg; 7-9 mcg/kg), Propofol 1-2 mg/kg (doses may be reduced depending on response), Rocuronium 0.6 – 1.0 mg/kg; bolus pressors PRN to maintain patient's MAP at pre-induction baseline to maintain CPP and minimize risk of hypoperfusion
- Other drugs: Remifentanyl, ICG dye (reconstitute ICG vial with 10mL of sterile water), decadron 8mg (given with antibiotics), Cefazolin 2000 mg unless allergy or otherwise indicated; IV Tylenol, Ondansetron, aprepitant (Emend) 40 mg PO
- Maintenance: Sevoflurane (0.5 MAC maximum if neuromonitoring) + 50% N2O + 50% O2; if patient has history of PONV can substitute nitrous for Propofol infusion 50mcg/kg/min

Temperature/Monitors:

- Temp Foley with bladder irrigation adapter & Esophageal Temp Probe if cooling
- Pre-induction arterial line if patient having active ischemic symptoms, TIA, neurologic symptoms; keep MAP at patient's baseline
- CVC – usually not indicated, consider if difficult access, need for prolonged vasoactive administration, or other standard indication for central access
- Sed line to facilitate burst suppression prior to artery cross-clamping
- PIV: 1 large bore PIV 16g+ usually in the saphenous
- Special bite block if neuromonitoring
- T&S Verification, Baseline ABG

Hemodynamic Goals: maintain pre-operative MAP to prevent hypoperfusion and maintain CPP

Surgery Steps (Direct EC-IC), what to consider during your anesthetic:

1. Doppler to map and mark the location of the superficial temporal artery (STA) on scalp with pen; skin incision made along artery
2. Preparation of the donor artery, muscle and connective tissue cut back to expose bone
3. Craniotomy, bone flap removed, dura exposed, dura opened and folded back to expose brain
4. Preparation of the recipient artery, microscope is wheeled in; surgeon identifies branch of middle cerebral artery for bypass
 - a. Reconstitute ICG dye as surgeon will ask for two separate 2.5 mL aliquots of ICG followed by a power flush
 - b. At the end of preparation prior to cross clamping of the recipient artery and attachment of the donor and recipient arteries, the surgeon will request burst suppression with Propofol, usually 0.5 mg/kg - 1mg/kg bolus while monitoring Sed line, preemptively bolus small amounts of pressors to prevent drop in pressure from Propofol, may need to increase neo infusion – MAP Goals usually 90-100 mmHg
 - c. Temporary clamps are applied to the recipient artery so that the surgeon can have a bloodless field to anastomose donor and recipient arteries, mark clamp time in the anesthesia record and start a timer
5. Attachment of donor and recipient arteries – averages 10-20 min
 - a. Mark clamp off in anesthesia record when clamp is removed
6. Checking flow through the bypass graft
 - a. ICG 2.5 mL injected to assess anastomosis, repeated x 1
 - b. Surgeon will clarify MAP goals for the rest of the case/postoperatively; may ask for preop baseline MAP and SBP, will ask for total cross clamp time
7. Closure of craniotomy
 - a. Administer Tylenol and Zofran
 - b. Wake up on Remi 0.05 mcg/kg/min
 - c. Extubate if appropriate and take to ICU

Complications: seizures, stroke, hemorrhage, brain swelling