Awake Craniotomy

Awake Craniotomies are reserved for tumors adjacent to or within the receptive or expressive speech areas of the dominant cortex or near motor areas. Patients are sedated during cranial opening, and are awakened once the dura is open. Direct cortical stimulation is performed to determine the relationship between the tumor and the speech or motor centers. The patient continues to converse during the tumor resection to ensure that surgical resection does not affect language function. (Jaffe, R. & Samuels, S., Anesthesiologist’s Manual of Surgical Procedures, 3rd edition. Williams & Wilkins, 2004.)

I. Surgical Considerations
   • The goal of the asleep-awake-asleep craniotomy is to keep the patient safe, calm, and comfortable during surgery so that the surgeon can obtain a clear assessment of brain mapping and tumor margins.

II. Pre-operative Considerations
   • Patient Education/Expectations for the Awake Portion:
     o Both the anesthesiology and surgical teams should prepare patient for the do’s and don’ts as well as encourage patient ‘buy-in’ to the process.
     o Gentle reminders regarding moving, itching, following commands, etc.
   • Premedications:
     o Consider aprepitant and phenazopyridine (bladder spasms with foley catheter)
     o Consider famotidine and/or metoclopramide (often already on PPI for stress-ulcer prophylaxis)
     o Avoid drugs that cannot be reversed or may limit neurologic assessment while awake (i.e. clonidine, dexmedetomidine, midazolam)
     o If necessary, only small doses of fentanyl

III. Case Setup
*Prepare for all phases up front
   • First Asleep: GA with LMA or ETT, arterial line, 2 PIVs
   • Awake: NC with EtCO2 monitoring (tegaderms to secure it to face, as patient will be in pins and unable to tuck behind ears).
   • Second Asleep: GA or deep sedation with native airway only
     o *CAVEAT: Dr. Southwell’s “awake” craniotomies receive a 2nd LMA.
   • Infusions: Propofol, Remifentanil, Phenylephrine, Clevidipine, Insulin (if DM)
   • Bolus Medications: PRN Propofol, Remifentanil for pinning, Vancomycin +Ancef, Dexamethasone, Mannitol, Keppra, Labetalol, Dexmedetomidine, +/- Succinylcholine
   • “Warming blanket” usually used to blow cool/ambient air in these cases

IV. Monitoring
   • Standard Monitors, arterial line
     o Arterial line is preferably placed in arm ipsilateral to tumor (if motor, will be monitoring in contralateral arm).

V. Intraoperative Considerations
   • First Asleep Portion:
     o Standard induction considering whether LMA or ETT placement
     o Pre-secure NC on patient’s face prior to taping down LMA or ETT
     o Start propofol ~100 mcg/kg/min infusion titrate down as much as possible to minimize wake-up time and maximize cognition upon awakening during the awake phase (targets should be
80mcg/kg/min after incision, and nearing 40mcg/kg/min after bone flap removed) remifentanil +/- 0.2 mcg/kg/min infusion, escalate as needed with decrement in propofol

○ For positioning, propofol or remi bolus (100mcg) prn for Mayfield pins. To maintain airway patency, be sure to have good “sniffing” position during Mayfield/head positioning and monitor for leak/airway pressures throughout. Consider placing pillow under the patient’s head, even though in pins, for comfort/illusion when waking up.

○ Decadron 10-20 mg (dose per surgery)

○ Antibiotics pre-incision: Usually vancomycin + Ancef, refer to Perioperative Antibiotic Guidelines for alternative therapy if contraindicated.

○ Begin mannitol at 0.5-1mg/kg (Dr. Friedman patients usually receive full bag, regardless)

○ SCD’s—make sure the pump is on!

○ Levetiracetam if needed (check the MAR for last dose given)

○ Send baseline ABG, assess insulin requirement at that time

**Awake Phase:**

○ **Call attending when waking up**

○ Propofol off; Remifentanil usually to off; Consider 0.01-0.02 mcg/kg/min- patient/surgery dependent (Most patients awaken within 6-10 minutes. If this does not occur, consider alternate differential for delayed emergence, possible administration of caffeine or physostigmine when available)

○ IV acetaminophen, ondansetron

○ Make sure, as per standard emergence, that tape is off eyes and surgical drape over face/head in optimal position

○ After eye opening, one-two reliable breaths and following a simple command, extubated quickly and switched to oxygen/CO2 monitoring via NC

○ Important considerations:

  I. Delirium is common—dexmedetomidine 0.1-0.2 mg/kg

  II. Hypertension is common—labetalol +/- rapid titration of clevidipine to SBP<160, preferably <140 while awake

  III. Seizures during brain mapping are less common but not rare- 1st line therapy is cold saline on the brain (surgeon administers); 2nd line therapy is propofol bolus (~20mg) communicate with surgery team prior to administration if AEDs already administered

**Final “Asleep” phase:**

○ For Dr. Southwell’s cases, as previously indicated, revert to infusion dosing as per first asleep portion.

○ For all other surgeons:

  I. Consider small propofol or dexmedetomidine bolus to go back to sleep

  II. Face mask/ NC oxygen with ETCO2 monitor

  III. The patient can be kept awake throughout this phase if needed—don’t get too aggressive with sedation (light MAC)

  IV. The most painful portion of this is the suturing of the skin and muscle; as local wears off, prudent to keep remifentanyl or PRN boluses of fentanyl/hydromorphone available to minimize discomfort and movement.

**VI. Postoperative Considerations**

○ Follow standard craniotomy considerations (SBP goal < 160mmHg in most cases)

**Revision History:**

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<td>2/16/2022</td>
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