Intracranial Aneurysm Surgery (CPT 61700, 61702)

**General:** Patients may be symptomatic or asymptomatic, may have a ruptured or an unruptured aneurysm(s), may be intubated, and may have vasospasm. You should know the location of the aneurysm(s) and SAH grade if applicable. Patients may have SAH related ECG abnormalities and/or myocardial dysfunction.

**Preop:** Premedicate with up to 2 mg iv midazolam depending on patients mental status. Remind the patient of potential postoperative intubation.

**Monitors:** Routine monitors. Arterial catheter inserted prior to intubation. Foley catheter after induction of anesthesia. Frequently SSEP and EEG monitoring.

**Anesthesia:** Goals are to avoid perioperative aneurysm rupture by preventing significant increases in blood pressure in response to stimulating events (intubation, pins, positioning, skin incision), to maintain adequate CPP (at least 70 mmHg) to prevent cerebral ischemia from brain retraction, temporary blood vessel occlusion and vasospasm, and to provide brain relaxation for good surgical exposure. Patients typically receive 1-2 g of Cefazolin, 10 mg of decadron and 1 gm/kg of mannitol on skin incision (verify all with surgeon). Induction of anesthesia with propofol. Fentanyl 5 µg /kg in divided doses throughout induction, prior to intubation. Severe hypertension should be treated aggressively (propofol, vasoactive drugs). Tape eyes, insert esophageal temperature probe, and at least one additional large bore IV. Patient position will depend on location of aneurysm. Maintain anesthesia with a propofol infusion (about 100 µg/kg/min), low dose inhalation agent (less than 0.5 MAC) and a fentanyl infusion 2 µg /kg/hr. Maintain muscle relaxation throughout the procedure (unless MEPs). Remember the increased dose requirements for muscle relaxants in patients taking tegretol or dilantin. Use moderate hyperventilation (PaCO₂ 30 mmHg). Intermittent blood sampling for ABG, hct, glucose and lytes. Maintain euvoelemia (mainly Lactated Ringers solution). Check that blood is available in the OR. Record all clip application on and off times. For EEG burst suppression have additional propofol available. When requested, increase propofol infusion to 150 µg/kg/min and administer additional propofol boluses (50 mg), till burst suppression is achieved. Administer additional propofol boluses to maintain burst suppression (communicate with neurophysiologists). As high dose propofol may delay awakening, reduce/eliminate the use of other anesthetics. If propofol decreases MAP, and/or if temporary clips are used, you may need to start a phenylephrine infusion to maintain adequate CPP. Fentanyl infusion is usually stopped at the beginning of closure (or burst suppression if used). Use of inhalation agents or propofol is usually stopped about 10-15 min before end of surgery. After aneurysm clipping in the presence of vasospasm, relative hypervolemia and above normal blood pressure may be indicated. Discuss postoperative blood pressure control with the surgeon before waking up the patient.

**Potential complications:** Cerebral ischemia from temporary blood vessel occlusion, retractor pressure or inadequate CPP (vasospasm). Perioperative rupture of aneurysm: maintain adequate intravascular volume, maintain CPP if temporary clips are used.

**Recovery:** Wake the patient up and extubate, if possible, immediately after the operation to allow neurologic examination. This may not be possible if a large quantity of propofol was used for EEG burst supression. Use a hemodynamic monitor and supplemental oxygen during patient transport to ICU.