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## Awake craniotomy anesthesia: A comparison between the monitored anesthesia care (MAC) versus the asleep-awake-asleep (AAA) technique

**Introduction:** Awake craniotomy (AC) with intraoperative brain mapping, allows for maximum tumor resection while monitoring neurological function. It is used for lesions involving the eloquent areas of the brain, such as Broca's, Wernicke's, or the primary motor area. Common techniques used are monitored anesthesia care (MAC), using an unprotected airway, or the asleep-awake-asleep (AAA) technique, using a partially or totally protected airway. Comparative analysis between the MAC and AAA technique in a consecutive series of patients undergoing the removal of an eloquent brain lesion is being presented.

**Method:** Approved by the appropriate Institutional Review Board (IRB), requirement for written informed consent was waived by the IRB. A prospective data collection and subsequent retrospective data analysis was conducted on 81 patients who underwent an awake craniotomy for an eloquent brain lesion over a nine year period. Fifty patients underwent anesthesia with the monitored anesthesia care (MAC) technique and 31 patients underwent the asleep-awake-asleep (AAA) technique by a single surgeon and a team of anesthesiologists. The monitored anesthesia care technique included, and was based on, no set protocol for sedation, different medications for MAC based on the comfort level of anesthesiologist, requirements of the patient and whether the scalp block is working well. Nose was sprayed with phenylephrine and the posterior pharynx was sprayed with lidocaine; the nasopharyngeal airway was coated with 5% lidocaine ointment which was then inserted into the more patent nostril, connected to the anesthesia circuit for oxygenation. For the AAA technique, propofol was used for induction, followed by laryngeal mask airway placement (LMA). An anesthesia circuit was attached to the LMA with the anesthesia being maintained with sevoflurane until the patient was spontaneously ventilating and asleep. A complete scalp block of the supraorbital, supratrochlear, auriculotemporal, zygomatico-temporal, greater occipital, lesser occipital and greater auricular nerves was performed by the neurosurgeon or anesthesiologist (Figure 1) in all patients. Infiltrative block was performed at the pinning site and also the incision site. After craniotomy, local anesthesia was infiltrated around the nerves supplying the dura mater by the surgeons. Bupivacaine or ropivacaine 0.5% with 1:200,000 epinephrine was

**Results:** Similar preoperative patient characteristics were observed in the two groups (Table 1). Operative time was shorter in the MAC group (283.5 mins.) versus the AAA (313.3 mins, p=0.038), by about 30 minutes. Hypertension was the most common intraoperative complication (MAC: 8% vs. AAA: 9.7%, p=0.794). Intraoperative seizures incident were 4% in the MAC group and 3.2% in the AAA group (p=0.858). Awake cases conversion to general anesthesia occurred in none of the MAC groups and 3.2% of the AAA cohort (p=0.201). No cases were aborted in either of the cohorts (Table 2). Mean hospital stay was 3.98 and 3.84 days in the MAC and AAA group, respectively (p=0.833) (Table 3).

**Conclusion:** Successful awake craniotomy requires cooperation between the surgeon and anesthesiologists, a working scalp block and infiltrative block, a good understanding of airway management and sedation protocol, as well as the ability to manage adverse intraoperative issues. Both MAC and AAA provide safe and effective anesthetic management for awake craniotomy.

### Recent Publications

1. Esenou Chikezie I, ReFaey Karim, et al. (2017) Awake craniotomy anesthesia: a comparison between the monitored anesthesia care versus the asleep-awake-asleep technique. World Neurosurgery 104:679–686.

2. Sokhal N, Rath G P, Chaturvedi A, et al. (2015) Anaesthesia for awake craniotomy: A retrospective study of 54 cases. Indian J Anaesth. 59(5):300–305.
3. Peruzzi P, Bergese SD, Viloria A, et al. (2011) A retrospective cohort-matched comparison of conscious sedation versus general anesthesia for supratentorial glioma resection: clinical article. J Neurosurg. 14(3):633–9.
4. Bilotta F and Rosa G (2009) 'Anesthesia' for awake neurosurgery. Curr Opin Anaesthesiol. 22(5):560–5.
5. Sanai N, Mirzadeh Z and Berger M S (2008) Functional outcome after language mapping for glioma resection. N Engl J Med. 358(1):18-27.

## Biography

Punita Tripathi was a practicing Cardiac Anesthesiologist at the All India Institute of Medical Sciences (AIIMS), New Delhi, before moving to USA in 1996. Thereafter, she completed her Residency in Anesthesiology from Harvard Medical School, Beth Israel Deaconess Medical Center, Boston, MA in 2002. Since 2002, she is a Faculty at the Johns Hopkins University, Baltimore. For the past five years, she has been Director of Neurosurgical Anesthesia at Johns Hopkins Bayview Medical Center and has been actively involved in writing protocols for Awake Craniotomy and Anesthesia for neurosurgical cases. Her areas of research interests are as follows: Neurosurgical Anesthesia, Thoracic Anesthesia and Obstetric Anesthesia. She has authored papers in many reputed journals and has written book chapters.

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