



ARTICLE OF THE MONTH

The Impact of Sedation on Brain Mapping: A Prospective, Interdisciplinary, Clinical Trial.

Ott C, Kerscher C, Luerding R, Doenitz C, Hoehne J, Zech N, Seemann M, Schlaier J, Brawanski A.
Neurosurgery. 2014 Aug;75(2):117-23. PMID: 24691469

In the August installment of SNACC's "Article of the Month", we look at a paper originating from Germany and authored by neurosurgeons, anesthesiologists, and neurologists, a truly multidisciplinary effort. The paper by Ott *et al.* delves into the issue of the optimal sedation/analgesic regimen for facilitating awake craniotomy. Specifically, three anesthetic modalities are compared: AAA (awake-awake-awake), SAS (asleep-awake-asleep), and RAS (regional with sedation). What the authors found is that any form of sedation prior to testing may affect the results obtained, although the clinical significance of this is unclear. In order to shed more light on these results, we have an expert commentary below written by Matthew C. Tate, MD, PhD. Dr. Tate is an Assistant Professor of Neurosurgery and Neurology at Northwestern University who is fellowship trained in awake/functional brain mapping and specializes clinically in awake brain tumor resection. As an esteemed colleague, it is an honor to have his input for this article which truly and meaningfully spans our disciplines in the spirit of collaboration in neuroscience. Please follow us on LinkedIn and let us know your thoughts on this or any previous topic. Thank you for your continued support of this SNACC initiative. We hope you will chime in on this and previous topics by joining in on the conversation by following the [SNACC LinkedIn Group](#).

~John F. Bebawy, MD

Commentary

Reviewer: Matthew C. Tate, MD/PhD

Awake craniotomy in combination with direct cortical and subcortical stimulation remains the gold standard for modern tumor and epilepsy surgery. This approach has been shown to reliably increase extent of resection (thereby improving oncologic control) while minimizing permanent postoperative neurologic morbidity. By definition, mapping of crucial cortical regions, with the exception of some motor pathways, requires the patient to be fully coherent during the testing phase of surgery. The two most common anesthetic protocols employed are awake-awake-awake (AAA) and asleep-awake-asleep (SAS). The AAA protocol relies on adequate local scalp blocks and has the theoretical advantage of improved patient cognition during mapping, as no long-acting systemic agents are used at any time during the operation. In contrast, SAS protocols utilize propofol and short-acting narcotics to titrate the level of alertness. While this approach has the potential advantage of increased patient comfort, for example during the opening and closing portions of the operation, the residual effects of these systemic medications, even in an overtly awake patient, are unknown.

The study by Ott et al. examines this question of the optimal anesthetic protocol for awake craniotomies by comparing a standard AAA protocol with two of the more common SAS regimens [total intravenous anesthesia (TIVA) and regional anesthesia with slight sedation (RAS)]. For SAS groups, patients underwent basic neuropsychological testing prior to induction of anesthesia and twice within 35 minutes of either extubation (TIVA) or end of sedation (RAS), including picture naming, working memory, word fluency, and fine motor function. In the AAA groups, patients were tested preoperatively and after dural opening. Patients undergoing an SAS protocol had a significant decline in essentially all functions examined when compared to the AAA group. These data indicate that for patients undergoing SAS anesthesia, even 30 minutes after stopping sedation, patients have a significant impairment in several important domains of neurologic performance. While there are some limitations to the current study, including the exclusion of neurosurgical patients from the SAS group and the clinical significance of decreased functional scores, it will be increasingly important to examine the time course of various anesthetic agents in isolation and in combination on intraoperative neurologic performance and ultimately postoperative function. This assessment will be particularly relevant as we extend our intraoperative testing repertoire to include more sophisticated or "higher-order" functions, as these neurologic processes would be more likely affected by residual sedation effects.