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SOCIETY FOR NEUROSCIENCE IN ANESTHESIOLOGY AND CRITICAL CARE

ARTICLE OF THE MONTH

Language Monitoring in Brain Surgery Under General Anesthesia

Martin J, Tyrand R, Lopez U, Bernasconi Pertusio F, Lysakowski C, Laganaro M, Schaller K, Boëx C

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Happy New Year everyone and welcome to the January 2020 Article of the Month. This month's article focuses on a novel pilot study where intra operative language mapping under general anesthesia was used to aid in resection of tumors close to eloquent cortex. This is one of the first studies to demonstrate that phonological processing can be measured during brain tumor resection under general anesthesia. Although future large-scale studies in this direction are required, this is an interesting step towards finding a suitable alternative to patients who are not able to undergo awake craniotomies for brain tumor resection.

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As always, readers are welcome to join us for further discussion on the **Twitter** feed or on **Facebook**.

~ Shilpa Rao, MD; Oana Maties, MD; Nina Schloemerkemper, MD and Amie Hoefnagel, MD

Commentary

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Awake craniotomy with language mapping, is the current standard for surgery aimed at achieving near total resection of tumors close to the eloquent cortex. One of the indications of this procedure is a brain tumor located close to the language area. Language is a highly evolved, complex, and sophisticated cognitive function in humans, therefore keeping the patient awake and continuously engaged in testing is often preferred. Although

awake craniotomy is feasible in most patients, not every patient is a suitable candidate. Some of the limitations include severe claustrophobia, mental and psychiatric disorders, inability to co-operate in language testing, significant language and cognitive barriers, etc. In current practice and literature, there is no other alternative to safely resect these critically located tumors in this particular patient population.

Martin et al. described their work of language monitoring in brain surgery under general anesthesia. The process begins with ear stimulation using the oddball paradigm (rare deviant sounds presented from time to time amongst standard sounds for the purpose of phonological processing). This generates a type of cerebral activity / evoked potentials as a response and can be recorded from the subdermal or cortical strip (also known as Mismatch Negativity). They showed detectable MMN in all five French native-speaking awake volunteers and seven out of eleven French native-speaking patients under general anesthesia. This study confirmed that the phonological processing persists during general anesthesia and is detectable in some patients and is the first study demonstrating this aspect.

This work is a preliminary exploratory study that confirmed the technological feasibility. However, MMN was detectable in only seven of eleven anesthetized patients. The hierarchical structure of language processing has phonological, semantic and syntactic levels, and this technology only monitors the phonological processing. Therefore, the clinical usability is in question because of its inability to monitor semantic and syntactic processing. Variation of both the location of the surgery and the language center in brain is another limitation. Further large-scale studies demonstrating the feasibility of this are required.

Nonetheless, it is interesting to see how this technology evolves as we are moving forward.