

Response to the authors' response to Schaller's comment, "How eloquent is eloquent?"

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Dear editor,

I had the pleasure to read the authors' response to my recent editorial concerning their article "Resection frequency map after awake respective surgery for non-lesional epilepsy involving eloquent areas".

First of all, and in view of their anticipation of "harsh criticism and even disbelief" when they had submitted their original manuscript, I would like to stress that my editorial was never meant to be insulting [5]. As it has been the very European style of this journal to stimulate frank and intense discussion amongst authors, readers and reviewers, I felt free to follow this enlightening tradition.

Being familiar with the principles of patient selection and of surgical treatment of pharmaco-resistant epileptics in an academic environment, I am well aware of patient groups that are notoriously difficult to treat. Cost- and time-intensive efforts in both clinical and basic research are underway in many centers around the world in order to expand our treatment options in those patients where straight-forward surgical approaches are not an option.

The authors have looked in detail at such a group indeed: patients with no structural lesion on modern imaging and with epileptogenic zones within—or overlapping with—so-called eloquent cortical regions. As I have mentioned in my editorial comment already: these patients are particularly difficult to investigate and to treat. A high proportion of them may undergo invasive diagnostics by implantation of depth and of subdural electrodes. It has been proposed even to use standardized bilateral implantation protocols where

lateralization of ictal onset cannot be clarified by surface EEG recordings [3]. Kim et al. have used invasive recordings in the $n=55$ patients who are representing their final study cohort, and all of them underwent awake craniotomy for resection of their epileptogenic zones with the further help of direct electrical cortical stimulation [2].

Whereas I have no doubt that this is technically feasible in an adapted environment, and in the hands of a team with experience in the field of awake craniotomies, I question the enthusiasm about it: Similar rates of seizure-freeness and equally low rates of permanent neurological worsening have been obtained in other series of (partially) eloquently located epileptogenic foci and/or lesions [1, 6]. Of course, it is left to each group's distinction to decide themselves whether they would prefer surgery under general anesthesia or as an awake craniotomy. Having placed subdural electrodes already, however, for extensive extra-operative pre-resective mapping, I personally don't see the additional value of keeping the patient awake during the final respective procedure.

Concerning the numbers and percentages provided, in their article in the section on "Postoperative neurological deficits and complications", Kim et al. state explicitly that "Postoperative neurological deficits...developed in ten patients (18.2%)... Among the ten patients who developed neurological deficits, seven patients (12.7%) had transient deficits.... Three patients (5.5%) presented with permanent deficits..." [2]. Should I have misunderstood the meaning of this paragraph after repeated reading, then the (real) numbers should have been presented in a clearer manner, probably.

Once again, I appreciate the efforts by the authors' group to further advance our resection technique in this subset of epileptic patients. In view of the results of other groups, I just wouldn't consider the application of awake craniotomy

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some sort of a quantum leap in our surgical armamentarium in order to tackle the issue of epileptogenic zones in or around eloquent areas of the brain. Concerning the precise delineation of anomalies that may have gone unnoticed by conventional imaging previously, I personally am more enthusiastic about new methods of (structural) image processing, such as morphometric MRI analysis, or co-registration of imaging together with EEG recordings [4, 7].

Conflicts of interest None.

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