

Letter to the Editor

Intraoperative magnetic resonance imaging for high grade glioma resection: Evidence-based or wishful thinking?

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Dear Editor,

In their review, Liang and Schulder provide an update on the role of intraoperative magnetic resonance imaging (iMRI) in gliomas.^[3] Whereas the authors do provide an overview of iMRI technology, it could have been a more critical review. After the first publications on iMRI, which appeared 15 years ago, the topic has been prominently visible in neurosurgical literature. However, during the past few years there seems to be a decline in interest in this technology, based on a reduced number of publications, but also from informal communicates. How did this happen?

First, we all know that gliomas in general, and high grade gliomas in particular, are a generalized disease of the brain instead of a localized process. This means that surgery can never be curative, and the (relative) merit of increased extent of tumor resection (EOTR) needs to be seen in this context. Still, if increased EOTR is associated with prolonged survival,^[4] technology that supports to achieve this goal in a safe manner is attractive. Of such technologies, iMRI is by far the most expensive, and convincing data on its added value are still limited. In our review,^[2] we demonstrated several forms of bias that exist in the literature on the topic, limiting the evidence level for iMRI guided resection. The only class I evidence on this topic comes from the randomized controlled trial by Senft *et al.*,^[5] but even this study is less convincing than the abstract suggests. The authors defined gross total resection (GTR) as less than 0.175 cc residual tumor, leading to 96% GTR in the iMRI group vs. 68% GTR in the control group. When looking at postoperative tumor volume, the median results are 0 cm³ vs. 0.03 cm³, respectively, and

it is debatable whether this difference is of clinical relevance. Besides, one can argue, whether the measured postoperative tumor volumes are within the confidence limits of the methods used for measuring this volumes. The authors did not find a difference in progression-free survival between both treatment arms, which might confirm that the clinical difference is less than the suggested difference based on GTR alone.

To continue, we do not have a valid endpoint for postoperative tumor volume. Interobserver agreement has been demonstrated to be unacceptably low in a pilot study on this topic,^[1] and the lack of a valid method for (postoperative) tumor volumetry further undermines the robustness of the data supporting iMRI. Even if measurements were correct, it is still unclear what to measure. The correlation between contrast enhancement and tumor presence is also limited, and other imaging modalities like 5-aminolevulinic acid (5-ALA)- or positron emitted tomography (PET) might be more cost-effective options in this context.

Another consideration is workflow integration, which is partially related to cost. iMRI guided surgery takes significantly more time, and can more or less interfere with the surgical workflow (e.g., compatibility of

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instruments or equipment) depending on the sort of iMRI technology used.

To conclude, despite class I evidence that iMRI guided surgery of high grade gliomas leads to increased EOTR, the clinical advantage is much less clear, and is limited by the nature of gliomas in itself. If we add the lack of a valid volumetric endpoint, and other modalities that offer comparable effectiveness for much less cost (like 5-ALA), then it becomes more understandable why iMRI seems to be losing interest in the international community.

In our opinion, narrative reviews on iMRI ornated with literature references but without a critical reflection, do not deserve a place in modern neurosurgical literature anymore, and the article's conclusion^[3] that there is "compelling

evidence" favoring iMRI seems more like wishful thinking than a critical reflection on the current evidence.

REFERENCES

1. Kubben PL, Postma AA, Kessels AG, van Overbeeke JJ, van Santbrink H. Intraobserver and interobserver agreement in volumetric assessment of glioblastoma multiforme resection. *Neurosurgery* 2010;67:1329-34.
2. Kubben PL, ter Meulen KJ, Schijns OE, ter Laak-Poort MP, van Overbeeke JJ, Santbrink H. Intraoperative MRI-guided resection of glioblastoma multiforme: A systematic review. *Lancet Oncol* 2011;12:1062-70.
3. Liang D, Schulder M. The role of intraoperative magnetic resonance imaging in glioma surgery. *Surg Neurol Int* 2012;3:320-7.
4. Sanai N, Berger MS. Glioma extent of resection and its impact on patient outcome. *Neurosurgery* 2008;62:753-64; discussion 264-6.
5. Senft C, Bink A, Franz K, Vatter H, Gasser T, Seifert V. Intraoperative MRI guidance and extent of resection in glioma surgery: A randomised, controlled trial. *Lancet Oncol* 2011;12:997-1003.

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