

3 Tesla intraoperative magnetic resonance imaging

The higher signal-to-noise ratio offered by 3 Tesla (T) iMRI compared with lower field strength systems is particularly advantageous.

To maximize efficiency, iMRI sequences can be tailored to particular types of tumors and [procedures](#), including nonenhancing brain tumor surgery, enhancing brain tumor surgery, transsphenoidal pituitary tumor surgery, and laser ablation. Unique imaging findings on iMRI include the presence of surgically induced enhancement, which can be a potential confounder for residual enhancing tumor, and hyperacute hemorrhage, which tends to have intermediate signal on T1-weighted sequences and high signal on T2-weighted sequences due to the presence of oxyhemoglobin. MR compatibility and radiofrequency shielding pose particularly stringent technical constraints at 3T and influence the design and usage of the surgical suite with iMRI ¹⁾.

García-Baizán et al. report the experience in the use of 3 tesla intraoperative magnetic resonance imaging (MRI) in neurosurgical [procedures](#) for tumors, and to evaluate the criteria for increasing the extension of resection.

This retrospective study included all consecutive intraoperative MRI studies done for neuro-oncologic disease in the first 13 months after the implementation of the technique. We registered possible immediate complications, the presence of tumor remnants, and whether the results of the intraoperative MRI study changed the surgical management. We recorded the duration of surgery in all cases.

The most common tumor was Glioblastoma recurrence, followed by primary glioblastoma and metastases. Complete resection was achieved in 28%, and tumor remnants remained in 72%. Intraoperative MRI enabled neurosurgeons to improve the extent of the resection in 85% of cases. The mean duration of surgery was 390±122minutes.

Intraoperative MRI using a strong magnetic field (3 teslas) is a valid new technique that enables precise study of the tumor resection to determine whether the resection can be extended without damaging eloquent zones. Although the use of MRI increases the duration of surgery, the time required decreases as the team becomes more familiar with the technique ²⁾.

¹⁾

Ginat DT, Swearingen B, Curry W, Cahill D, Madsen J, Schaefer PW. 3 Tesla intraoperative MRI for brain tumor surgery. *J Magn Reson Imaging*. 2014 Jun;39(6):1357-65. PubMed PMID: 24921066.

²⁾

García-Baizán A, Tomás-Biosca A, Bartolomé Leal P, Domínguez PD, García de Eulate Ruiz R, Tejada S, Zubieta JL. Intraoperative 3 tesla magnetic resonance imaging: our experience in tumors. *Radiologia*. 2018 Jan 17. pii: S0033-8338(17)30217-5. doi: 10.1016/j.rx.2017.12.002. [Epub ahead of print] English, Spanish. PubMed PMID: 29361284.

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