Implementation of a Low Field Intraoperative MR Scanner. Does MRI-guided Surgery of Malignant Gliomas Improve Resection?

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Introduction

Intraoperative MRI (iMRI) Polestar N30 was recently installed in our neurosurgical unit. The goal was to use this low field low time consuming scanner in various types of brain surgeries (i.e. resection of both low and high grade primary intracerebral tumors, metastasis, colloid cysts and pituitary tumors) in order to obtain a better and more complete tumor resection.

Methods

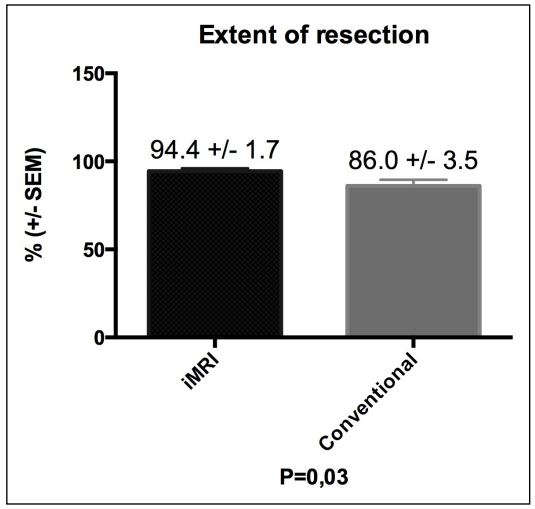
Adult patients with contrast enhancing malignant gliomas located within the frontal or temporal regions and amenable to complete or near-complete resection (> 90%) were included in this retrospective study.

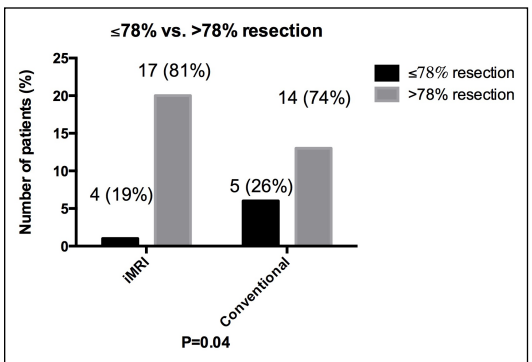
Patients were allocated to surgery in the iMRI-suite or in a conventional surgical suite dependent on availability. Immediate preoperative and postoperative high field MRI images were used to estimate the size of contrast enhancing tumor tissue and the extent of resection (EOR) was calculated. Time spend in the operating suite, actual surgery time and new neurological deficits were recorded.

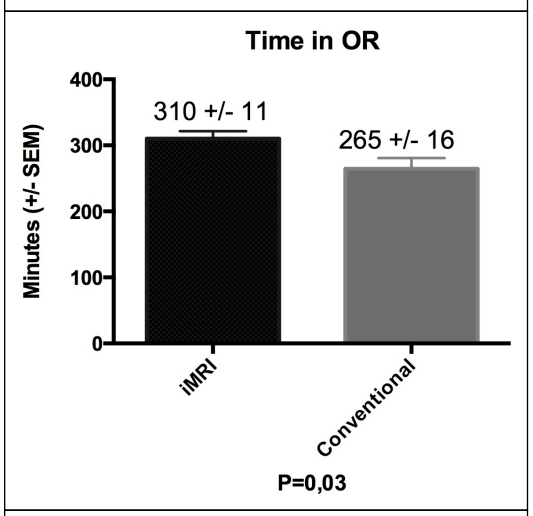
Results

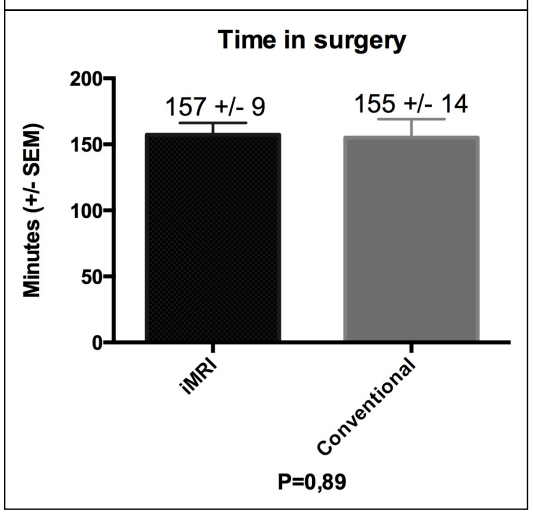
Groups were comparable with regard to age, tumor location, and preoperative tumor volume.

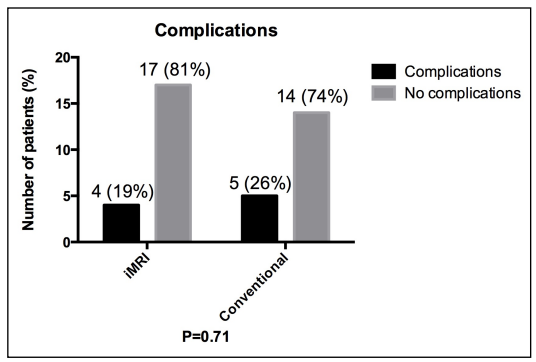
Extent of resection was significantly larger in the iMRI group (94% vs 86%, p = 0.03). The number of patients with an EOR higher than 78%, a published cut-off value for improved survival(1), was higher in the iMRI group (95% VS 68%, p = 0.04). Time spend in the OR was longer in the iMRI group (310 min vs 267 min, p = 0.03) whereas actual surgery time was similar between groups (157 min vs 155 min, p = 0.89). No difference was observed in postoperative complication rates.











Conclusions

In our hands the use of iMRI may aid in obtaining a more extensive tumor resection which in spite of increased time spend in the operation suite does not result in increased complication rates.

Learning Objectives

By the conclusion of this session, participants should know that the use of intraoperative low field MRI likely improves the extent of resection of malignant gliomas without a higher complication rate.

References

1. Sanai N, Polley MY, McDermott MW, Parsa AT, Berger MS. An extent of resection threshold for newly diagnosed glioblastomas. J Neurosurg. Jul 2011;115(1):3-8.