The Impact of Intraoperative Magnetic Resonance Imaging (iMRI) in Gliobastoma Multiforme and Glioma on Survival Rates in a Community Hospital

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Introduction

Intraoperative magnetic resonance imaging (iMRI) has become a major development in the field of neurosurgery, allowing surgeons to take real time high-resolution images intraoperatively. iMRI has been shown to be very useful in the evaluation of tumor resection and complications from neurosurgery such as hemorrhage and brain shift. iMRI is found in many academic institutions but is relatively new in community hospitals. This study measures the effectiveness of iMRI in a community hospital in gliobastoma multiforme (GBM) and glioma cases by looking at the effect of additional tumor resection on gross total resection and length of survival

Figure 1: IMRIS Magnet

Methods

A total of 260 cases from 2006 to 2015 were analyzed retrospectively. Cases in which pathology revealed GBM or glioma were analyzed by whether there was additional tumor resection and average length of survival. Of the 260 cases, 28 cases were identified as either GBM or primary glial neoplasms. The length of survival was then stratified by age, gender and location of the tumor. An unpaired t-test was performed to analyze the average length of survival in patients

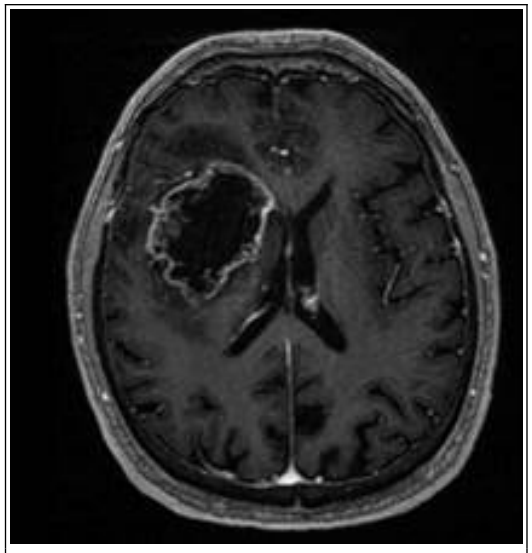

Figure 2: Contrasted T1 MRI of 84 year old male who presented with gait imbalance and left hemiparesis. Visualized is a right frontal enhancing lesion with necrotic core.

Results

Results showed additional tumor resection was performed in 12/28 (42.86%) of the cases. The average length of survival in patients with additional tumor resected was 28.364 months. The average length of survival in patients with no additional tumor resected was 14.00 months. An unpaired one-tailed test revealed a p-value of 0.06

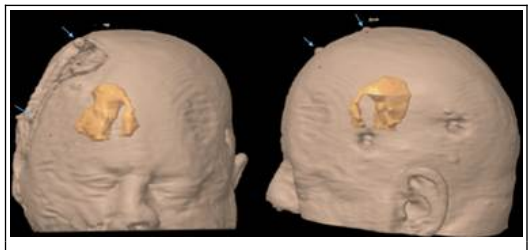

Figure 3: Brainlab three dimensional reconstruction for stereotactic guidance, AP and lateral views after intial debulking. Blue arrows indicate fiducial markers. Tumor in gold indicating the residual component is continuous and the initial resection removed only the central and inferior portions of tumor.

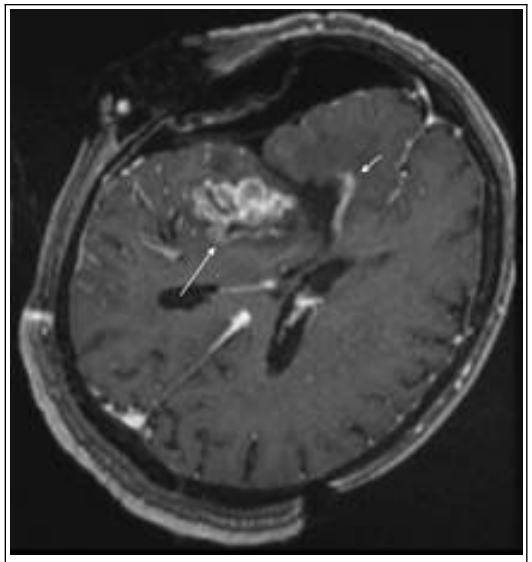

Figure 4: T1 contrasted intra-operative MRI after initial debulking that was felt to have been gross total resection. Medial and lateral portions resected but residual tumor anterior and posterior (arrows).

Conclusions

iMRI was helpful in achieving more total gross resection of GBM and gliomas in our practice. This increase in gross total resection may have lead to improve survival outcomes and improved the length of survival in patients. However, the unpaired t-test revealed a p-value of 0.06 for the length of survival, which is considered to be not quite statically significant. This may be due to the low number of GBM and glioma cases that were performed in our practice. The increased life expectancy with the use of iMRI was independent of age, gender, and location. Future studies can look at a larger number of cases to increase the power of the study.

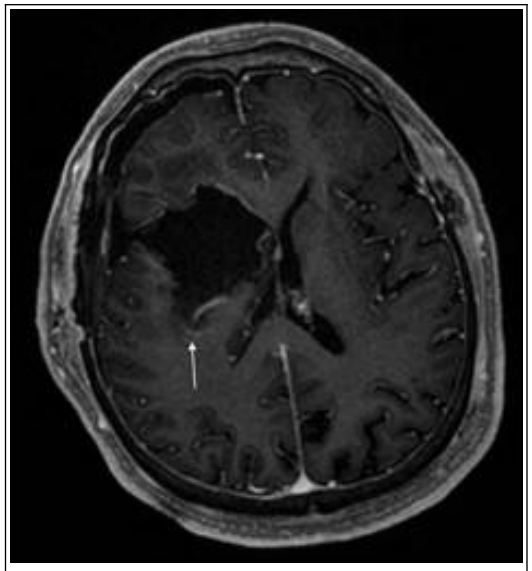

Figure 5: Post operative T1 contrasted MRI. Improved resection, small residual (arrow) where resection was minimized because of proximity to motor cortex

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