



MR enhancement as a predictor for malignant degeneration in progressive low-grade gliomas: An update with survival analysis

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Introduction

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Methods

Patients with a pathologic diagnosis of WHO grade II glioma who underwent biopsy or resection at time of progression from 1995-2010 were retrospectively reviewed (n=92), with 17 patients undergoing multiple repeat resections, allowing for 109 evaluable records. MRIs were examined for new contrast enhancement, which was analyzed as a predictor of high-grade transformation. The log-rank test was performed to compare Kaplan-Meier survival curves between patient subsets.

Results

Median age at diagnosis was 40.0 years. Distribution of pathology consisted of astrocytoma (48%), oligodendroglioma (44%), and oligoastrocytoma (8%). Malignant degeneration was present in 74 specimens (68%). Sensitivity (sens) and specificity (spec) of MR contrast enhancement for high-grade transformation were 89% and 57% respectively, while positive (PPV) and negative predictive values (NPV) were 81% and 71%. Rate of prior radiation amongst patients with falsely positive MR enhancement (33%) was not significant higher than among true positives (40%). Values were similar when excluding patients who only underwent biopsy at time of progression (sens 89%, spec 60%, PPV 83%, NPV 71%). New contrast enhancement predicted worse survival (p=0.0005) in both patients maintaining low grade histology (mOS: 92.5 mos vs. not reached) and those with high-grade transformation (mOS: 29.5 vs. 76.7 mos), despite a similar distribution of grade 4 histology amongst false negatives and true positives. While patients who maintained low-grade histology did not experience worse survival with biopsy alone compared with resection, patients with high grade transformation fared poorly after biopsy alone (mOS: 2.9 mos vs. 44.9 mos, p<0.0001).

Conclusions

New MRI enhancement and pathologic grade continued to be discordant in greater than 20% of cases, largely due to a lack of specificity of enhancement for predicting malignant degeneration. As such, pathologic confirmation should be attempted when safe, with maximally safe resection being the surgery of choice if high suspicion for malignant degeneration exists. Beyond functioning as a surrogate for pathologic grade, new MRI enhancement may independently predict for worse outcomes, a concept which merits further investigation.

Learning Objectives

New MRI enhancement and pathologic grade continued to be discordant in greater than 20% of cases, largely due to a lack of specificity of enhancement for predicting malignant degeneration.

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