Grading Glioma- moving closer to pathology with advanced MRI techniques

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Purpose

To review the role of advanced MRI techniques of perfusion imaging, diffusion tensor imaging, susceptibility weighted imaging and MR spectroscopy in grading glioma.

Outline of content

Grading of glioma is of significant clinical importance because high-grade gliomas have dismal prognosis and are usually treated with adjuvant radiation therapy or chemotherapy after resection, whereas low-grade gliomas are not. The current standard criterion for grading i.e. histopathologic assessment, has two major limitations a) inherent sampling error associated with biopsy, and b) inability to evaluate residual tumor tissue after cytoreductive surgery. Perfusion MR imaging noninvasively measures cerebral perfusion via the assessment of various hemodynamic measurements, such as cerebral blood volume, cerebral blood flow, mean transit time and permeability of tumor vessels. Diffusion-weighted MR imaging provides information on water diffusion. There appears to be a correlation between the diffusion coefficient and tumor cellularity. Diffusion tensor imaging gives information about the diffusion tensor matrices (anisotropy indices) within the tumor and an information about the invasion of surrounding white matter. Susceptibility weighted imaging helps to detect micro hemorrhage within the tumor. MR spectroscopy gives information about the metabolites such as choline, NAA, creatine, inositol, lipid and lactate. The exhibit will illustrate each of this technique in clinical cases of glioma through imaging- histopathology correlations.

Summary

Combining the information derived from the imaging markers of advanced MRI techniques, the grade of glioma can be predicted.