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Diagnostic Performance of Advanced MRI in Differentiating High-Grade from Low-Grade Gliomas in a Setting of Routine Service

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Abstract

Objective: To evaluate the usefulness of advanced MRI techniques in differentiating high-grade (HGG) from low-grade gliomas (LGG).

Material and Method: Sixty-four patients with suspected gliomas were prospectively evaluated by conventional and advanced MRI studies including MR spectroscopy (MRS), diffusion tensor imagining (DTI), and dynamic susceptibility contrast (DSC) MRI. The parametric measurements of metabolic profile, cerebral blood volume, flow (CBV, CBF), apparent diffusion coefficient (ADC), fractional anisotropy, and their ratios by internal normalization were analyzed to differentiate LGG from HGG. Histopathologic findings were used as the gold standard.

Results: Forty-three cases with pathologically-proven gliomas were included. The best discriminating features between HGG and LGG were CBV and CBF of the solid tumoral region ($p<0.05$) whereas the minADC/corpus callosum ratio for DTI and the ratio of Cho/Cr for MRS of the solid tumoral region provided the best diagnostic performance ($p<0.05$). With a predetermined threshold for each parametric measurement, the combination of all advanced MRI modalities was associated with the best accuracy whereas the combination of DSC MRI and MRS provided the highest specificity. When all parametric measurements were positive, the probability of HGG was 0.889.

Conclusion: Comprehensive advanced MRI studies provided better diagnostic performance than using conventional MRI alone in the evaluation of gliomas.

Keywords: Gliomas, MRI, Advanced

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