Can multiparametric MRI and FDG-PET predict outcome in diffuse brainstem glioma? A report from a prospective phase-II study.


Abstract

PURPOSE: To study the impact of multiparametric MRI and (18)F-FDG-PET on the outcome of children with diffuse intrinsic pontine gliomas (DIPG).

MATERIALS AND METHODS: Imaging data from a phase-II prospective therapeutic study in children with newly diagnosed DIPG were considered for evaluation. They included baseline MRI with contrast enhancement before treatment. Functional imaging included MR spectroscopy, MR perfusion and FDG-PET studies. All patients (n = 20) had baseline MRI and 11 patients had FDG-PET. Response was assessed by MRI and PET 4 weeks after therapy. Baseline imaging findings were correlated with survival. Presence or absence of adverse parameters on MRI (heterogeneous contrast enhancement, hyperperfusion or increased choline:NAA ratio) was used to develop a cumulative radiological prognostic index (RPI). Sensitivity and specificity of each imaging modality in tumour grading was estimated.

RESULTS: The cumulative RPI was able to classify the patients into different grades and was predictive of overall survival (p = 0.02). MR perfusion also predicted survival (p = 0.039). Sensitivity and specificity of MRI and FDG-PET to detect low-grade gliomas were low to moderate (33-66%), but moderate to high in detecting high-grade gliomas (50-100%). Baseline FDG uptake on PET scan did not correlate with survival (p = 0.7).

CONCLUSIONS: Cumulative RPI was able to classify tumours into different grades and predicted clinical outcome. At baseline, MR hyperperfusion indicated a shorter survival for DIPG patients. Sensitivity and specificity of imaging modalities to detect low-grade gliomas were poor.

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