head and neck cancer

TUMOR VASCULAR HETEROGENEITY AS A BIOMARKER OF RESPONSE TO ANTI-ANGIOGENIC TREATMENT IN PATIENTS WITH NASOPHARYNGEAL CARCINOMA

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Aim: Nasopharyngeal carcinoma (NPC) is endemic in East and Southeast Asia. Anti-angiogenic drugs have been explored for the treatment of advanced NPC. Tumor vascular heterogeneity may be a useful biomarker in patients treated with anti-angiogenic therapy. This study aims to evaluate the impact of tumor vascular heterogeneity, derived from textural analysis of dynamic contrast-enhanced computed tomography (DCE-CT) perfusion characteristics in patients with NPC treated with the anti-angiogenic drug, pazopanib.

Methods: DCE-CT images of 33 patients, with recurrent/metastatic NPC treated with pazopanib, were analyzed to derive tumor blood flow, fractional intravascular blood volume, fractional extravascular-extracellular volume, and permeability surface area product. To each parametric map, textural analysis was applied to characterize its heterogeneity. A subset of reproducible and important textures, were selected by a cut-off on the coefficient of variation and random forest variable importance, respectively. These textures are summarized by principal components analysis and their relationship to outcomes evaluated using Cox proportional hazards, receiver-operating characteristics, Kaplan-Meier and logistics regression analysis.

Results: The first principal component of the reproducible and important textural features of pre-treatment fractional intravascular blood volume (PC1) was related to survival outcomes. There was a 45% risk reduction (hazards ratio 0.55, 95% CI: 0.45-0.89, p = 0.016) per standard deviation increase in PC1. The areas under the ROC curves were 0.72 (95% CI 0.51-0.93, p = 0.038), 0.81 (95% CI: 0.64-0.98, p < 0.001) and 0.72 (95% CI: 0.52-0.92, p = 0.030), in predicting one-, two- and three-year overall survival, respectively. Using Kaplan Meier analysis, overall survival was significantly higher for patients with PC1 values greater than the median (p = 0.002). There was no statistically significant association between DCE-textures and overall response.

Conclusions: Heterogeneity of tumor intravascular blood volumes may be an important biomarker for predicting overall survival in patients with NPC treated with anti-angiogenic therapy.

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