ABSTRACT

Incidence, molecular characteristics, and imaging features of "clinically-defined pseudoprogression" in newly diagnosed glioblastoma treated with chemoradiation.

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PURPOSE: Pseudoprogression (PsP) remains an elusive and clinically important,

yet ill-defined, phenomena that, generally, involves a period of early radiographic progression (enhancement) followed by a period of radiographic stability or regression. In the current study, we utilized data from the control arm of a phase III clinical trial in newly-diagnosed glioblastoma to explore imaging characteristics of "clinically-defined PsP", or early radiographic progression (PFS < 6 months from chemoradiation) followed by a long post-progression residual overall survival (ROS > 12 months).

METHODS: One hundred sixty-nine patients with newly-diagnosed GBM from the control arm of the AVAglio trial (NCT00943826) who presented with early radiographic progressive disease (PD) (< 6 months) were included. Clinical characteristics, topographical patterns, and radiomic features were compared between newly-diagnosed GBM exhibiting early PD and early death (< 12-month ROS, "true PD") with those exhibiting early PD and a long residual survival (> 12-month ROS, "clinically-defined PsP").

RESULTS: "Clinically-defined PsP" occurred to 38.5% of patients with early PD, and was more associated with MGMT methylation (P = 0.02), younger age (P = 0.003), better neurological performance (P = 0.01), and lower contrast-enhancing tumor volume (P = 0.002) at baseline. GBM showing "true PD" occurred more frequently in the right internal capsule, thalamus, lentiform nucleus, and temporal lobe than those with "clinical PsP". Radiomic analysis predicted "clinical PsP" with > 70% accuracy on the validation dataset.

CONCLUSION: Patients with early PD that eventually exhibit "clinically-defined PsP" have distinct clinical, molecular, and MRI characteristics. This information may be useful for treating clinicians to better understand the potential risks and outcome in patients exhibiting early radiographic changes following chemoradiation.