ABSTRACT

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A Cohort Study on Prognostic Factors for Laser Interstitial Thermal Therapy Success in Newly Diagnosed Glioblastoma.

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BACKGROUND: Laser interstitial thermal therapy (LITT) is a promising approach for cytoreduction of deep-seated gliomas. However, parameters contributing to treatment success remain unclear.

OBJECTIVE: To identify extent of ablation (EOA) and time to chemotherapy (TTC) as predictors of improved overall and progression-free survival (OS, PFS) and suggest laser parameters to achieve optimal EOA.

METHODS: Demographic, clinical, and survival data were collected retrospectively from 20 patients undergoing LITT for newly diagnosed glioblastoma (nGBM). EOA was calculated through magnetic resonance imaging-based volumetric analysis. Kaplan-Meier and multivariate Cox regression were used to examine the relationship between EOA with OS and PFS accounting for covariates (age, isocitrate dehydrogenase-1 (IDH1) mutation, O6-methylguanine-DNA methyltransferase hypermethylation). The effect of laser thermodynamic parameters (power, energy, time) on EOA was identified through linear regression.

RESULTS: Median OS and PFS for the entire cohort were 36.2 and 3.5 mo respectively. Patient's with >70% EOA had significantly improved PFS compared to ≤70% EOA (5.2 vs 2.3 mo, P = .01) and trended toward improved OS (36.2 vs 11 mo, P = .07) on univariate and multivariate analysis. Total laser power was a significant predictor for increased EOA when accounting for preoperative lesion volume (P = .001). Chemotherapy within 16 d of surgery significantly predicted improved PFS compared to delaying chemotherapy (9.4 vs 3.1 mo, P = .009).

CONCLUSION: Increased EOA was a predictor of improved PFS with evidence of a trend toward improved OS in LITT treatment of nGBM. A strategy favoring higher laser power during tumor ablation may achieve optimal EOA. Early transition to chemotherapy after LITT improves PFS.

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