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Risk of Tract Seeding Following Laser Interstitial Thermal Therapy for Brain Tumors

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Abstract

Background: The management of intracranial oncological disease remains a significant challenge despite advances in systemic cancer therapy. Laser interstitial thermal therapy (LITT) represents a novel treatment for local control of brain tumors through photocoagulation with a stereotactically implanted laser fiber. Because the use of laser interstitial thermal therapy continues to increase within neurosurgery, characterization of LITT is necessary to improve outcomes.

Objective: To quantify the risk of tumor seeding along the laser fiber tract in patients receiving LITT for primary or metastatic brain tumors at a high-volume treatment center.

Methods: We retrospectively reviewed all patients receiving LITT from 2015 to 2021 at our medical center. Patients with biopsy-confirmed tumors were included in this study. Tract seeding was identified as discontinuous, newly enhancing tumor along the LITT tract.

Results: Fifty-six patients received LITT for biopsy-confirmed tumors from 2015 to 2021, with tract seeding identified in 3 (5.4%). Twenty-nine (51.8%) patients had gliomas, while the remainder had metastases, of which lung was the most common histology (20 patients, 74%). Tract seeding was associated with ablation proceeding inward from superficial tumor margin closest to the cranial entry point ($P = .03$). Patients with tract seeding had a shorter median time to progression of 1.1 (0.1-1.3) months vs 4.2 (2.2-8.6) months ($P = .03$).

Conclusion: Although the risk of tract seeding after LITT is reassuringly low, it is associated with decreased progression-free survival. This risk may be related to surgical technique or experience. Follow-up radiosurgery to the LITT tract has the potential to prevent this complication.

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