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Magnetic resonance guided laser interstitial thermal therapy in pediatric brain tumors: an institutional case series

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Abstract

Background: Complete microsurgical removal of pediatric brain tumors remains a significant prognostic factor, but it is still associated with a significant degree of morbidity and mortality. Magnetic resonance-guided laser interstitial thermal therapy (MRgLITT) has recently been proposed for tumor ablation as an alternative to microsurgery in deep or eloquent tumors. We describe our experience and outcomes of using MRgLITT to treat pediatric brain tumors and analyze its limitations and strengths.

Methods: We performed a retrospective analysis of 24 consecutive pediatric patients with brain tumors who underwent MRgLITT at our center. Clinical, radiological, and surgical data were retrospectively reviewed.

Results: Twenty-five LITT procedures were performed on 24 patients. Median age at diagnosis was 7.5 years (range 1.2-15.09). The median tumor volume was 1.24 cm^3. The cerebellum was the most common tumor location (11/24), followed by the cerebral hemisphere (7/24), thalamus (3/24), optic pathway (1/24), brainstem (1/24), and IV ventricle (1/24). Patients were followed for a median 3.2 (range 0.1-14.9) years. Of the 17 children with low-grade tumors, 11 underwent LITT at disease progression, and 6 underwent LITT at diagnosis. The 3-year PFS since the LITT was 100%. None of the children with low-grade tumors died. Of the seven children with high-grade tumors, 6 underwent the LITT procedure at disease progression. Four patients progressed and died after the LITT procedure, with an OS curve of 22.2% at 1.7 years after LITT.

Conclusions: MRgLITT is a safe and effective approach for treating pediatric brain tumors with selected indications and has significant potential for use in several brain tumor treatment algorithms.