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Safety and efficacy of Cesium-131 brachytherapy for brain tumors

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Abstract

Background: The introduction of Cesium-131 (Cs-131) as a radiation source has led to a resurgence of brachytherapy for central nervous system (CNS) tumors. The aim of this study was to evaluate the safety and efficacy of the largest cohort of Cs-131 patients to-date.

Methods: A retrospective review of all CNS tumors treated with resection and adjuvant Cs-131 brachytherapy at New York-Presbyterian/Weill Cornell from 2010 to 2021 was performed. Overall survival (OS) and local control (LC) were assessed with Kaplan-Meier methodology. Univariable analysis was conducted to identify patient factors associated with local recurrence or radiation necrosis.

Results: Adjuvant Cs-131 brachytherapy following resection was performed in 119 patients with a median follow-up time of 11.8 (IQR 4.7-23.6) months and a mean of 22.3 +/-30.3 months. 1-year survival rates were 53.3% (95%CI 41.9-64.6%) for brain metastases (BrM), 45.9% (95%CI 24.8-67.0%) for gliomas, and 73.3% (95%CI 50.9-95.7%) for meningiomas. 1-year local control rates were 84.7% for BrM, 34.1% for gliomas, and 83.3% for meningiomas ($p < 0.001$). For BrM, local control was superior in NSCLC relative to other BrM pathologies (90.8% versus 76.5%, $p = 0.039$). Radiographic radiation necrosis (RN) was identified in 10 (8.4%) cases and demonstrated an association with smaller median tumor size (2.4 [IQR 1.8-2.7 cm] versus 3.1 [IQR 2.4-3.8 cm], $p = 0.034$). Wound complications occurred in 14 (11.8%) patients.

Conclusions: Cs-131 brachytherapy demonstrated a favorable safety and efficacy profile characterized by high rates of local control for all treated pathologies. The concept of brachytherapy has seen a resurgence given the excellent results when Cs-131 is used as a source.

Keywords: Brachytherapy; Cesium-131, brain metastasis; Glioma; Meningioma.

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