Cesium-131 brachytherapy

- Cesium-131 collagen tile brachytherapy for salvage of recurrent intracranial metastases
- A prospective study of minimally invasive keyhole craniotomy and stereotactic brachytherapy for new brain oligometastases
- Cesium 131 seeds for high-grade gliomas: a systematic review and meta-analysis of gammatile as a brachytherapy innovation
- Prostate Brachytherapy With Cs-131: Long-term Results Compared With Published Stereotactic Body Radiotherapy Data
- Early experience and perioperative risk of GammaTile for upfront brain metastases: Report from a prospective multicenter study
- Surgically targeted radiation therapy versus stereotactic radiation therapy: A dosimetric comparison for brain metastasis resection cavities
- Fluorescence and immune-cell infiltration of nonneoplastic, postbrachytherapy brain tissue in 5-ALA-guided resection of recurrent anaplastic meningioma: illustrative case
- GammaTile() (GT) as a brachytherapy platform for rapidly proliferating glioblastomas: from case series to clinical trials

The introduction of Cesium-131 (Cs-131) as a radiation source has led to a resurgence of brachytherapy for central nervous system (CNS) tumors.

Literature review

Palmisciano et al. reviewed the literature on cesium-131 brachytherapy for brain tumors.

PubMed, Web-of-Science, Scopus, Clinicaltrial.gov, and Cochrane were searched following the PRISMA extension for scoping reviews to include published studies and ongoing trials reporting cesium-131 brachytherapy for brain tumors.

They included 27 published studies comprising 279 patients with 293 lesions, and 3 ongoing trials. Most patients had brain metastases (63.1%), followed by high-grade gliomas (23.3%), of WHO Grade III (15.2%) and Grade IV (84.8%), and meningiomas (13.6%), mostly of WHO Grade II (62.8%) and Grade III (27.9%). Most brain metastases were newly diagnosed (72.3%), while most gliomas and meningiomas were recurrent (95.4% and 88.4%). Patients underwent gross-total (91.1%) or subtotal (8.9%) resection, with median postoperative cavity size of 3.5 cm (range 1-5.8 cm). A median of 20, 28, and 16 seeds were implanted in gliomas, meningiomas, and brain metastases, with median seed activity of 3.8 mCi (range 2.4-5 mCi). The Median follow-up was 16.2 months (range 0.6-72 months). 1-year freedom from progression rates were local 94% (range 57-100%), regional 85.1% (range 55.6-93.8%), and distant 53.5% (range 26.3-67.4%). Post-treatment radiation necrosis, seizure, and surgical wound infection occurred in 3.4%, 4.7%, and 4.3% of patients.

Initial data suggest that cesium-131 brachytherapy is safe and effective in primary or metastatic malignant brain tumors. Ongoing trials are evaluating long-term locoregional tumor control and future studies should analyze its role in multimodal systemic tumor management [1)].

Case series

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 [2)]

[1)]

Palmisciano P, Haider AS, Balasubramanian K, D'Amico RS, Wernicke AG. The role of cesium-131 brachytherapy in brain tumors: a scoping review of the literature and ongoing clinical trials. J Neurooncol. 2022 Jun 13. doi: 10.1007/s11060-022-04050-3. Epub ahead of print. PMID: 35696019.

[2)]

Bander ED, Kelly A, Ma X, Christos PJ, Wernicke AG, Stieg PE, Trichter S, Knisely JPS, Ramakrishna R, Schwartz TH. Safety and efficacy of Cesium-131 brachytherapy for brain tumors. J Neurooncol. 2023 May 30. doi: 10.1007/s11060-023-04352-0. Epub ahead of print. PMID: 37249824.