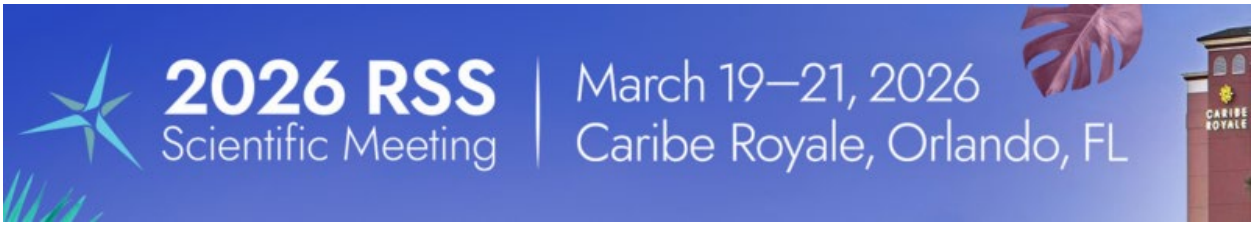

Stereotactic Body Radiation Therapy for Management of Locally Advanced Periorbital Tumors: Efficacy and Toxicity Profile

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Objectives: The management of locally advanced periorbital skin tumors is challenging, especially in those with orbital invasion. 0rbital exenteration has long been considered the gold standard. This study assesses the efficacy and toxicity of stereotactic body radiation therapy (SBRT) as a treatment option in the new paradigm shift towards 'eye-sparing' strategies

Methods: This is a retrospective analysis of twenty six patients with locally advanced periorbital tumors who were prospectively treated with SBRT. Tumors involve canthi (zone III or IV) in twenty patients with more than one zone involvement in eighteen of them. Four patients presented with complete periorbital skin invasion (zone V).

Eighteen tumors violated the orbital septum, with anterior orbital space invasion in sixteen and middle orbital space involvement in fourteen. Extraconal violation was seen in sixteen patients and intraconal invasion in fifteen. All presented with intact vision in the ipsilateral eye. SBRT with simultaneous boost (35- 40Gy/ 25Gy) delivered in five biweekly fractions. Maximum point dose to "Orbit-PRV and Optic N PRV" were limited to 30 Gy. Lacrimal gland mean dose to < 30 Gy when it was feasible. Local/regional recurrence and treatment-related toxicity were evaluated using CTCAE grading v5.0 . Statistical analysis utilized the SAS (or SPSS) version.

Results: Twenty-three patients presented with primary periorbital skin tumors: squamous cell carcinoma (n=15), basal cell carcinoma (n=6), and Merkel cell carcinoma (n=2). Three additional patients had advanced orbital tumors—solitary fibrous tumor (n=1), sebaceous cell carcinoma (n=1), and metastatic breast cancer (n=1). SBRT was delivered as definitive therapy in 19 patients and adjuvant therapy in 7; all patients completed treatment.

Median planning target volumes (PTVs) were 45 cc (PTV25) and 9 cc (PTV35–40 Gy), with corresponding median D90 values of 29 Gy and 34/42 Gy, respectively. At a median follow-up of 12 months (range 4–42 months), all patients retained intact vision. Twenty-one achieved complete response, one had stable disease, and three experienced locoregional recurrences—one cavernous sinus failure and two local-regional relapses.

Acute toxicities were predominantly mild: Grade 1 dermatitis (n = 15), conjunctivitis (n = 8), diplopia (n = 7), orbital pain (n = 1), and hyperpigmentation (n = 2). Grade 2 dermatitis occurred in 6 patients, while Grade 3 dermatitis was uncommon (n = 2), both requiring reconstructive grafting.

On long-term follow-up, 6 patients reported blurry vision, 2 reported orbital pain, and 3 developed

epiphora. Two patients developed progressive cataracts, and isolated cases of trichiasis (n = 1) and post-surgical ptosis (n = 2) were observed. One of four patients with zone V involvement developed a chronic corneal ulcer requiring surgical management.

Conclusion(s): SBRT may represent a viable and effective eye-sparing alternative to orbital exenteration or conventionally fractionated radiotherapy for periorbital skin cancers. In this cohort, SBRT achieved excellent local control with preservation of vision and minimal toxicity. These results support further prospective evaluation of SBRT as a safe, precise, and cosmetically favorable non-surgical treatment for this challenging clinical scenario.