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## Abstract

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## Clinical Outcomes of Patients with High Risk Uveal Melanoma Treated with A Novel LINAC Based Frameless Fractionated Stereotactic Radiosurgery

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## Abstract

### Objectives:

Investigate the use of fractionated stereotactic radiosurgery (fSRS) with a novel inhouse eye localization/monitoring system for the treatment of uveal melanoma (UM), and explore clinical outcomes and associated toxicities. The primary endpoint was local control, and the secondary endpoints included eye preservation rate, visual acuity, and toxicity.

### Methods:

This is a retrospective study of patients with uveal melanoma received LINAC based frameless fSRS at our institution. All patients were treated on Truebeam STx with an inhouse eye localization and monitoring system. Patients were immobilized with Brainlab thermoplastic head mask with eyes exposed. A 3D printed localization box with gaze point and camera was used. Radiation planning was done with Brainlab iPlan with dynamic Arcs techniques. All patients received 50 Gy in 10 Gy fractions, treated every other day. All patients have formal ophthalmological evaluation before and after radiation treatment. We collected treatment records that included risk factors such as diabetes and hypertension pre-treatment, prior radiation history, visual acuity (LogMAR), focal thickness measured by optical coherence tomography (OCT), treatment response based on tumor diameter and thickness pre and post treatment, as well as acute and delayed adverse events.

### Results:

A total of 23 patients (16 male, 7 female) with high-risk (large/recurrent tumor deemed not suitable for eye plaque) UM were included the study. Median age was 64 years old (37-86 years), Karnofsky Performance Score was 90 (70-100). 9 (39.1%) received prior plaque brachytherapy. 5 (21.7%) patients received Bevacizumab, 3(13%) Triamcinolone and and 3(13%) Aflibercept intra-ocular injection after finishing radiation treatment. Median pre-treatment tumor diameter/thickness was 17.5 mm/2.95 mm. Median LogMAR pre-post FSRT was 0.4 (Snellen 20/50) and 1.0 (20/200), respectively. Median follow-up

With a median follow up of 22 m, the 1-year local control (LC) rate was 95.4%, 2-y LC was 90.1%, and 3-y LC was 85.6% per Kaplan-Meier (KM) analysis. Two enucleations were required in total with one due to tumor progression and the other neovascular glaucoma (NVG). For acute adverse events, one patient reported Grade III eye pain and one experienced grade I floaters and flashes. Reported delayed adverse events included one patient with Grade III eye pain, one with Grade I eye pain, and two patients with Grade III watery discharge of the eye. Median LogMAR pre-post FSRT was 0.4 (Snellen 20/50) and 1.0 (20/200), respectively, similar to pretreatment. 9 patients developed Radiation Papillopathy, 5 developed Radiation Retinopathy, 2 developed Radiation Maculopathy, and 2 developed Optic Atrophy.

### Conclusion(s):

Our institution's novel LINAC based frameless fSRS demonstrated favorable local control and toxicity profile for higher risk UM. Patients treated with FSRT maintained high rates of eye preservation, as well as limited severe Grade III toxicities related to treatment. Exploration with a larger sample size and prospective trial is

warranted to further demonstrate the utility of LINAC based fSRS in this treatment setting.