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EASTERN TIME [GMT-4]

Single institution's experience with clinical implementation of uniform scanning proton beams for ocular melanoma treatment

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INTRODUCTION

- Ocular melanoma is the rare malignant tumor that arises in the pigmented part of the eye or in the conjunctiva and has metastatic potential.
- In this study, we investigated the clinical implementation of the uniform scanning proton therapy (USPT) for ocular melanoma treatment in gantry-based treatment room without dedicated beamline.

METHOD

- Firstly, optic immobilization device (OID) along with an eye monitoring camera (EMC) was developed.
- OID and EMC were installed on the arc which can be indexed to the treatment table.
- OID and EMC have the flexibility of changing angularly and in-and-out to adjust the eye in the optimal treatment position.
- Secondly, various beam parameters (proton range (g/cm^2), modulation (g/cm^2), output, and profile) were compared between TPS and measurements for aperture sizes ranged up to 2×2 cm^2.
- Treatment plans were generated for a total dose 50 Gy (RBE) in 5 fractions.
- During CT simulation and treatment, the patient was coached to look at the OID light.

- The treatment plan was calculated with a minimum of 3 beams that included apertures opening of >2cm, 1mm grid size, smearing of 0.2cm.
- All beams avoided the tantalum clips.

RESULTS

- The PTV coverage (V95) was 98.5% with D95 of 49.3 Gy (RBE).
- The mean dose (Gy (RBE)) and dose to 0.03cc volume of ciliary body, right lens, macula, right optic nerve and retina was 0.48 & 1.4, 0.35 & 0.34, 51 & 51.6, 5.98 & 36.45, and 28.6 & 54.45 respectively.
- The maximum dose to optic disc and right nerve were 49.19 and 50.38 Gy (RBE), respectively.
- Patient setup based on the bony anatomy and alignment with fiducials showed the largest correction in any given translational direction less than 0.2mm.

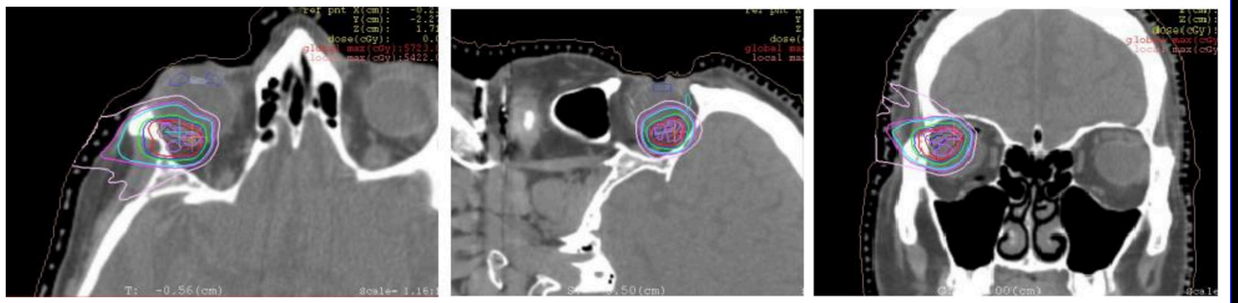

Figure 1: Treatment planning for an ocular melanoma patient

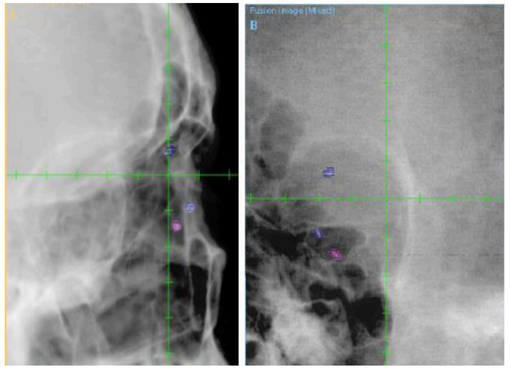

Figure 2: Setup verification using a kV image pair

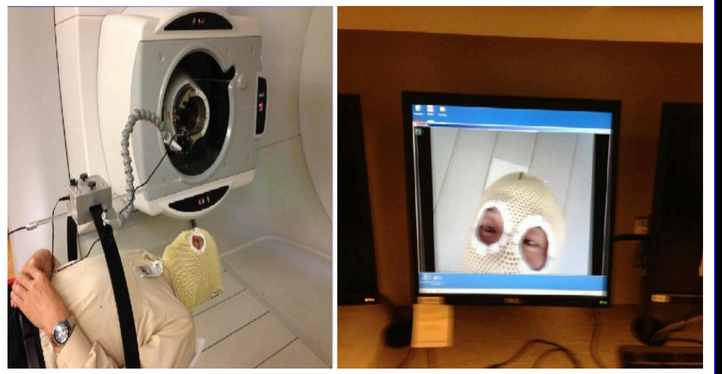

Figure 3: Patient setup with optic immobilization device (OID) along with an eye monitoring camera (EMC).

CONCLUSIONS

We implemented USPT for ocular melanoma treatment. The fiducial alignment obtained utilizing OID and EMC was clinically acceptable.

REFERENCES

Hartsell WF, Kapur R, Hartsell SO, et al. Feasibility of Proton Beam Therapy for Ocular Melanoma Using a Novel 3D Treatment Planning Technique. *Int J Radiat Oncol Biol Phys*. 2016;95(1):353-359. doi:10.1016/j.ijrobp.2016.02.039

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