Streamlining a Predictable Workflow for Fixated Custom Oral Positioning Device in Head and Neck IMPT

Background: Proton-based radiotherapy to the head and neck requires fixation of a rigid custom oral positioning device (OPD) to a thermoplastic radiation mask to immobilize anatomical structures for accurate and reliable radiation delivery. Current practices utilize pre-fabricated thermoplastic OPDs but the standardized design limits aspects like tissue displacement, fixation positioning, and patient comfort.

Methods: This clinical case shows an alternative workflow for fabricating an OPD for IMPT-based adjuvant management of a P16 positive, T2, N1, M0 squamous cell carcinoma involving the right tonsil. It utilizes a combination of analog and digital dental techniques to produce a customized 3-D printed OPD within 2 appointments.

Results: The resulting OPD from the alternative workflow demonstrates an accurate and reliable fit that required no significant adjustments. Further, it was able to be repeatedly positioned and fixated to the thermoplastic mask without significant deviation that required modification to IMPT planning and treatment.

Conclusion: A custom, proton beam compatible, 3-D printed OPD with external fixation components can be accurately and efficiently produced by using this proposed workflow while enabling optimal radiation delivery without delay or modifications in treatment.

Keyworks:
Radiation Oncology
Intensity Modulated Proton Therapy (IMPT)
Head and Neck Cancer
Squamous Cell Carcinoma (SCC)