2592 Customized Tongue-Displacing Dental Stents for Oral Mucosal Sparing and Immobilization in Head and Neck Radiotherapy

L. R. Sales[1], J. Liao[1], B. Johnson[2], A. Winston[2], G. Laramore[1], U. Parvathaneni[1]
[1]University of Washington, Seattle, WA, [2]Seattle Special Care Dentistry, Seattle, WA

Purpose/Objective(s): Advances in conformal head and neck radiotherapy have allowed greater sparing of normal tissues. However, painful oral mucositis remains a major dose-limiting toxicity. Simple non-customized bite blocks or corks have been used to immobilize oral structures, but are poorly reproducible and provide limited displacement of uninvolved oral mucosa. Customized tongue-displacing dental stents (CTDS) provide rigid and reproducible immobilization and may improve oral mucosal sparing by displacing uninvolved mucosal structures away from high dose radiation volumes. We retrospectively reviewed our clinical experience using CTDS and evaluated dosimetric parameters relating to oral mucosal sparing.

Materials/Methods: From August 2008 to March 2010, twenty-three patients with Stage III-IVB squamous cell carcinoma of the oral cavity, oropharynx or nasopharynx underwent definitive chemoradiation and CTDS immobilization at the University of Washington. A CTDS was designed during pre-radiation dental evaluation in collaboration with the treating radiation oncologist. A light-cured acrylic resin was used to build maxillary/mandibular arches and a tongue paddle incorporated for tongue displacement (depression and/or deviation) away from the primary tumor. CT simulation and daily treatments were performed with CTDS in position. All but one patient was treated with IMRT, and all received 70 Gy to gross disease. We compared diagnostic CT scans without CTDS to the CT simulation scans with CTDS to identify the oral mucosa that was displaced. Using the Pinnacle treatment planning system, we auto-contoured the region between the stent and the remaining oral cavity, which represented the displaced oral mucosal volume that would have been irradiated without CTDS. This was assigned tissue density and dose-volume histograms generated to determine the volume and dosimetric parameters of the spared oral mucosa.

Res**ults:** CTDS were well-tolerated with no unexpected mucosal reactions. Mean volume of oral mucosa spared was 51 cc (range 23 - 95 cc). Stage III patients had larger volumes spared compared to Stage IV (mean 73 vs 48 cc). Nasopharyngeal patients had the most sparing (mean 61 cc).With CTDS, an estimated mean of 10% of the displaced oral mucosal volume avoided exposure to 70 Gy, 22% avoided 66 Gy, 56% avoided 50 Gy, and 79% avoided 35 Gy. No patient had greater than RTOG grade 3 acute mucositis. Mean percent weight loss during treatment was 8%. There were no unplanned treatment breaks.

Conclusions: CTDS achieve superior oral mucosal sparing compared to what is achievable by conformal planning alone. They provide reproducible immobilization, are well tolerated, and can readily be incorporated into clinical practice.

Author Disclosure: L.R. Sales: None. J. Liao: None. B. Johnson: None. A.Winston: None. G. Laramore: None. U. Parvathaneni: None.