

AbstractID: 12986 Title: Evaluation of Reproducibility of Immobilization Device for Head-and-Neck Radiotherapy

**Purpose:** To evaluate two commercially available Head-and-Neck immobilization devices for daily treatment setup and their correlations to anatomy changes. The study represents an early implementation experience with the Orfit mask, which was new to our clinic.

**Method and Materials:** Twenty-one patients enrolled in an in-house adaptive radiotherapy protocol using daily CT guided treatment were randomly assigned to one of two different thermoplastic masks: 5-Point Efficast mask from Orfit (ORFIT Industries, Jericho, NY) or the extended S-Board mask from Civco (CIVCO/MedTec, Orange City, IA). The daily setup displacements in each of the antero-posterior(AP), supero-inferior(SI), and medio-lateral(ML) direction were determined using a 3D rigid image registration technique with the C2 vertebral body as the bony landmark. Systematic and random setup errors were computed for each group. The Pearson product-moment correlation coefficient was used to determine the correlation between parotid shrinkage and the magnitudes of 3D displacements.

**Results:** The random errors in AP, SI, and ML directions for Orfit mask (10 patients) were 0.13, 0.12, 0.11cm, and 0.12, 0.16, 0.11cm for the Civco mask (11 patients), respectively. The systematic errors were 0.20, 0.12, 0.16 cm for the Orfit mask, and 0.16, 0.16, 0.13 cm for the Civco mask, respectively. The Orfit mask significantly reduced the setup error in SI direction. However, in the AP and ML directions the systematic error increased with the Orfit mask, although the random errors were similar. The magnitude of the total (3D) shift was found to be correlated with the percent of parotid shrinkage for the Civco mask ( $p=0.026$ ), but not for the Orfit mask.

**Conclusion:** Although the Orfit mask reduced setup error in SI direction due to its head rest design, setup errors in AP and ML directions increased mainly due to increased systematic mask preparation errors. User training may be important.

**No conflict of interest.**