Purpose: To evaluate the cervical spine (c-spine) and mandible reproducibility of the CDR Mayo Mold and Civco Type-S head and neck immobilization system using Mosaiq Setup Intelligence Curve Image Registration

Methods: Patients were immobilized with either the Mayo Mold or Civco Type-S head and neck immobilization systems. Using curve image registration tools in Mosaiq, the c-spine and mandible were outlined. For each lateral image, two separate image registrations were performed using an initial kV image as reference - 1) c-spine only  2) mandible only. To evaluate the relative difference between the c-spine and mandible position, the mandible image registration results were subtracted from the c-spine image registration results. To evaluate whether the initial difference between the planning CT and the first kV setup image is larger than subsequent daily imaging variations, the difference in the image registration of the DRR was compared to the variation in subsequent image registrations. The degree of neck flexion was determined by observing the amount of mismatch between the upper and lower cervical spine after the pitch correction.

Results: During the first weeks of treatment, there was minimal difference in the image registration results for both the c-spine and mandible individually, and in the relative difference between them. For neck flexion, the Mayo Mold system demonstrated 82.6% minimal difference and 3.8% significant difference between the alignment of upper and lower c spine, vs. 84% and 5.2% for the S frame. For some patients, there is a greater difference between the DRR and the initial kV image registration than the variation in registrations for subsequent daily imaging.

Conclusions: Preliminary results indicate minimal difference in the c-spine and mandible reproducibility between the two immobilization systems during the first weeks of treatment. Further analysis of whether this minimal difference remains consistent throughout the entire course and treatment and with greater number of patients is needed.