AbstractID: 7982 Title: The Efficacy of Thermoplastic Masks for Head Immobilization in Stereotactic Radiosurgery/Radiotherapy and Intensity Modulated Radiotherapy

Highly conformal treatment delivery requires precise immobilization to insure that the entire target volume is treated and critical structures avoided. Thermoplastic masks are used as immobilization devices for conformal and conventional radiotherapy. It is desirable to know the ability of these devices to constrain patient movement during treatment. We use the Med-Tec thermoplastic head immobilization system, with reinforcing strips, to constrain patient movement during CyberKnife procedures. The robotic CyberKnife platform includes an orthogonal pair of digital-radiographic x-ray systems that are used to confirm patient position. We create a conformal plan based on CTs obtained with the patient fitted in the custom mask. A library of DRRs representing incremental translational patient offsets from the ideal position is generated for both imaging system views. Software compares the DRR library to acquired digital radiographs to determine the best matches and records the resultant offsets from the ideal position. Prior to treatment, the patient position is adjusted to reduce these offsets to within about 1mm of the planning position. Intermittently during treatment, additional image pairs are acquired, compared to the DRRs, and the updated offsets are used to adjust the aim of the robotically controlled accelerator to treat as planned. We have treated 268 fractions over 49 patients. We are analyzing these shifts to determine the ability of the mask system to constrain the patient during treatment. A detailed analysis of the results will be presented.