

AbstractID: 8348 Title: MVCT-guided Partial-breast Irradiation in Prone Position: Daily Setup Uncertainty and Dose Verification

Purpose: We analyzed the daily setup uncertainty and dose verification for partial-breast irradiation (PBI) in prone position using helical tomotherapy. **Method and Materials:** According to an in-house protocol, early-stage breast cancer patients received PBI treatments in the prone position on the TomoTherapy Hi-Art system using megavoltage-CT guidance (TomoTherapy, Inc., Madison, WI). For planning, kilovoltage-CT scans were obtained with the involved breast suspended downward. Treatment plans were generated based on criteria from the NSABP B-39/RTOG 0413 protocol; the PTV_eval was to receive 3.85 Gy per fraction over 10 fractions administered twice daily. Before each fraction, an MVCT scan was acquired and compared with the planning kVCT images to refine the patient position. Along each shift direction, a margin to estimate the setup uncertainty for treatments without MVCT guidance was calculated from the average and standard deviation among the daily shifts. The dose actually delivered in each fraction was reconstructed based on the daily MVCT, accounting for the daily shifts. Among all fractions, the average and standard deviation for specific DVH points were compiled for comparison with the plan DVH. **Results:** Among the MVCT-guided shift data, the random setup uncertainty in general exceeds the systematic difference from the plan. The overall margin was as large as 24.5 mm among the cases analyzed. From the MVCT-based recalculations, the reconstructed doses differed little from the planned doses for each breast, each lung, thyroid, and heart. Average reconstructed doses for PTV_eval were slightly lower than the planned dose, attributable to increased breast thickness for some fractions. Yet, at least 90% of PTV_eval received over 90% of the prescribed dose. **Conclusions:** The estimated margin to account for setup uncertainty motivates improvements for PBI positioning. With MVCT guidance for prone-positioned PBI, the deviation of the delivered target and organ-at-risk doses from the planned dose is minimal.