

AbstractID: 1788 Title: Dosimetric Comparison between 3D Conformal SRT and IMRTs with Different Multileaf Collimators (Novalis m3, Varian mlc-120 and Varian mlc-80) in the Treatment of Brain Tumors

We investigated the dosimetric differences between 3D conformal radiotherapy and intensity modulated radiotherapy, and the impact of collimator leaf-width on IMRT plans for the treatment of non-spherical brain tumors. Ten patients with non-spherical brain metastases who had been treated with 3-D conformal SRT with Novalis m3 were selected. We performed the IMRT plans with different MLCs (Novalis m3, Varian MLC-120, and Varian MLC-80) for all the cases with the same number of beams and gantry positions as had been used in the 3-D conformal SRT treatment plans. Treatment planning utilized the BrainSCAN 5.21 treatment planning system (BrainLAB AG, Heimstetten, Germany). For each patient, the dose constraints and optimization parameters were identical for the three IMRT plans. We found that the IMRT plans significantly improved the dose conformity to the target compared with the 3D conformal SRT treatment plans ($p < 0.002$), while the dose to the normal tissues stayed at the same level. For the brain tumors adjacent to (or partially overlapping with) critical structures, while improving PTV conformity, IMRT dramatically spared the volume of the critical structures to be irradiated. In one case, 94.6% of V_{50} for the critical structure by 3D conformal SRT could be reduced to 25.5, 29.4 and 54.9% for IMRT with m3, IMRT with MLC-120 and IMRT with MLC-80, respectively. However, for patients with relatively regular brain tumors, the impact of MLC leaf-width was not clinically important. We conclude that IMRT utilizing small leaf-width MLC is optimal for irregular tumors, particularly for those close to critical structures.