AbstractID: 1420 Title: Study of Dosimetric Difference among a 3mm Micro-MLC, a 5mm MLC and a 10mm MLC in Stereotactic Radiosurgery

This paper studied the dosimetric difference among a 3-mm-leaf-width micro-MLC, a 5-mm-leaf-width and a 10-mm-leaf-width MLC for stereotactic radiosurgery. Thirty-four cranial cases treated with conformal dynamic arcs, and twenty-four cranial and extra-cranial cases treated with IMRT were investigated. The ratios of conformity index, percentage target coverage at prescription dose, and the organ-at-risk doses at typical percentage volumes between two treatment plans using two different MLCs were studied. For patients treated with conformal dynamic arcs, the conformity index ratio was volume related. For patients in the following target volume groups: (1) V<1cc, (2) 1cc<V< 8cc, (3) 8cc<V<27cc, and (4) V> 27cc, the conformity index ratio between the 5-mm MLC and 3-mm MLC was 1.37±0.09, 1.12±0.04, 1.08±0.02 and 1.04±0.01 respectively; the conformity index ratio between the 10-mm MLC and 3-mm MLC was 2.00±0.33, 1.45±0.09, 1.28±0.09 and 1.18±0.05 respectively. The target coverage were comparable among different MLCs, except for the first volume group, the 5-mm MLC and the 10-mm MLC both had slightly better dose coverage than 3-mm MLC (1.03±0.03). For patients treated with IMRT, the conformity index ratio between the 5-mm MLC and 3-mm MLC was 0.995±0.05 and 0.997±0.05 respectively for patients in group (3) and group (4) (IMRT patients had larger lesions). The ratio between 10-mm and 3-mm MLC was 1.08±0.08 and 1.02±0.07 respectively for these two groups. The 3-mm MLC showed slightly better overall organ-at-risk DVHs than the 5-mm and 10-mm MLCs. In two brain cases, 3-mm MLC showed remarkable better DVHs than others.