AbstractID: 9078 Title: Image Guided Hypofractionated IMRT for Multiple Intracranial Metastases – An Alternative to Arc-based SRS

Purpose: Stereotactic radiosurgery (SRS) uses an invasive head-frame and involves long treatment times when multiple isocenter plans are treated, which becomes intolerable for some patients. This study evaluates intensity-modulated radiotherapy (IMRT) for treating multiple (≥4) intracranial tumors in comparison to arc-based SRS.

Methods and Materials: This study involved 3 patients treated with image-guided hypofractionated IMRT (Eclipse) and 3 treated with SRS using arc therapy (XKnifeRT). There were 28 intracranial lesions in total with planning target volumes (PTVs) ranging from 0.195cc to 5.64cc. For this study, 3 IMRT patients were re-planned for arc therapy, while 3 SRS patients were re-planned for PTVs (=GTVs+2mm) for both IMRT and arc therapy. By keeping the minimum surface dose of the PTVs the same between the IMRT and arc plans, we have compared maximum doses and PITV (the ratio between the volume of Prescribed Isodoseline and the Target Volume) for the two methods. We also compared the doses received by 10%, 20% and 50% of the whole brain, as well as the maximum doses to the critical structures (eyes and brainstem).

Results: The average maximum doses to the 28 targets were 125.85%+/- 18.4% for arc plans and 115.2%+/-4.6% for IMRT plans. The average PITVs were 2.65+/-1.22 and 1.93+/-0.52 for the arc and IMRT plans, respectively. For critical structures, average doses received by 10%, 20% and 50% of the brains, as well as the maximum doses to other structures, were higher for IMRT plans. However, the treatment time for IMRT is significantly reduced (e.g. 15 min) compared to that for multiple isocenter SRS (up to hours).

Conclusions: IMRT plans appeared to achieve comparable conformality compared to arc based SRS. This provides a good alternative for poor performance status patients. However, further study needs to be conducted to ensure the PITV calculation accuracy for small targets.