

AbstractID: 8300 Title: Setup accuracy of a thermoplastic mask system using two-dimensional (2D) on-board imager (OBI) for fractionated stereotactic radiotherapy (FSRT)

Abstract:

Purpose : To analyze the setup accuracy of a thermoplastic mask system using two-dimensional (2D) on-board imager (OBI) and compare the results with the relocatable Gill-Thomas-Cosman (GTC) frame for fractionated stereotactic radiotherapy (FSRT).

Method: Residual setup accuracy of 9 patients with brain lesions undergoing image-guided hypo-fractionated FSRT immobilized using a thermoplastic mask system were retrospectively studied. For each patient, image-guided setup was performed for each treatment using orthogonal pairs of 2D OBI radiographs registered with reference digitally reconstructed radiography (DRR). Residual errors in the anterior-posterior (A/P), right-left (R/L) and superior-inferior (S/I) directions were measured using in-house software by contouring and comparing the location of bony anatomy on the DRRs and the orthogonal pairs of OBI radiographs taken immediately before the radiation treatment. The PTV margins required to ensure minimum dose to CTV is 95% for 90% of patients as proposed by Van Herk were also calculated for each direction.

Result: Totally, setup accuracy was successfully analyzed for 45 fractions (5 fractions for each patient). The mean and standard deviation (SD) of the residual errors in the A/P, R/L, and S/I directions were  $0.04 \pm 0.79$  (mean  $\pm$  1 SD) mm,  $0.3 \pm 1.32$  mm, and  $-0.39 \pm 0.51$  mm respectively. The required margin to guarantee adequate PTV coverage were 2.57 mm, 3.98 mm and 1.86 mm in respectively the AP, R/L, and S/I direction. These margins were comparable to the 3mm PTV margin currently used for the hypo-fractionated treatment using the GTC frame at our institution.

Conclusion: The setup accuracy of 2D image-guided FSRT immobilized with the thermoplastic mask system is compatible to the GTC frame for patients with brain lesions.