

AbstractID: 9102 Title: CINE-magnetic resonance image assessment of intra-fraction prostate motion

Purpose: To measure the intra-fraction prostate motion with CINE magnetic resonance imaging (MRI) for patients in supine or prone position and with or without rectal balloon.

Methods: The prostate motion within four-minute time interval was investigated for seven patients using 17 series of CINE MRI. For each series, four sets of images were sequentially taken for each patient in supine/prone position and with/without rectal balloon. Saline water was injected into rectum for scans without rectal balloon. In each set of images, 100 sagittal images of 1.0 cm slice thickness in the prostate region were acquired sequentially with b-FFE (balanced Fast Field Echo) sequence. The b-FFE sequence reduces the scan time to 2.4 second. For each series, contours for prostate, rectum, bladder, abdominal wall etc. were manually on the first image and then copied to next 99 images using auto deformation tool. And, a movie loop of 100 images with contours was made to inspect the fidelity and quality of images and contours. The magnitude of the relative movement of the center of mass (COM) of prostate was automatically computed from prostate contours. Recorded data was further reduced to a mean and standard deviation over a time interval of 30 seconds to smooth periodical motion induced by breathing for prone position.

Results: Larger movement was observed on the superior side of prostate with the interior edge as its rotation pivot point. For prone position, the magnitudes of the relative movement at the time of 4 minutes are 2.1 mm +/- 1.9mm and 1.7 mm +/- 1.1 mm for without and with rectal balloon respectively. For supine position, the magnitudes are 1.5 mm +/- 1.4mm and 1.3 mm +/-1.2 mm for without and with rectal balloon respectively.

Conclusions: The COM movement is a good surrogate for the intra-fraction prostate motion.