

AbstractID: 6601 Title: Evaluation of Ultrasound Localization versus MV Portal Images of Fiducial Markers in Prostates

Purpose:

This pilot study evaluated prostate localization by comparing ultrasound images to orthogonal MV portal images of fiducial markers implanted into the prostate.

Method and Materials:

Each prostate patient had gold fiducial markers implanted into his prostate prior to simulation. The Restitu™ ultrasound system (Resonant Medical, Inc.) was used to acquire the ultrasound images. The first ultrasound image was acquired immediately prior to acquiring the CT simulation image. These images were fused using the CT isocenter, and the prostate reference volume was contoured for each patient. This contour included a portion of the inferior bladder wall near the trigone to assist with daily localization. Each day, therapists acquired an ultrasound image and overlaid the prostate reference volume contour onto the current image. Orthogonal MV portal images were then acquired. Displacements of imaged fiducials from their expected locations as observed on the DRRs were removed by shifting the couch if the displacements exceeded 5 mm. Following treatment, the location of each fiducial in all 3 directions was measured on the final portal images for each day and averaged to measure the final prostate location. Differences in where the ultrasound image and where the portal images of fiducials would locate the prostate were compared.

Results:

For 11 patients, the differences are less than 6.1 mm within the 95% confidence interval. For 1 patient, ultrasound imaging did not consistently reproduce the prostate location to within 10 mm as compared to fiducials via our technique. Sources of deviation include slight discrepancies in calibrating the ultrasound systems, slice spacing, different users, fusion discrepancies, image quality, and random uncertainties.

Conclusion:

For most patients, ultrasound and ports of fiducials provide comparable localization information for prostates. However, sources of disagreement still exist. Anatomical landmarks can be useful in most cases but can also be misleading if improperly used.