

AbstractID: 1693 Title: Image-guided partial breast irradiation with on-board kV imaging of radio-opaque markers

The availability of kV imaging onboard a medical accelerator provides several methods of image guidance to improve treatment accuracy. One approach is to localize radio-opaque markers using a near-orthogonal pair of projection images to assess patient setup prior to treatment. This approach is particularly attractive for accelerated partial breast radiotherapy using external beam where surgical clips placed during lumpectomy can be readily detected in kV images. In previous work, using repeat CT scans of 28 patients, we demonstrated that these surgical clips are a strong radiographic surrogate for the biopsy cavity. This study suggested that, using clips to guide setup, a PTV margin reduction of about 5 mm is possible. In the present study, in order to mimic actual clinical practice, clips were localized using 2D digitally reconstructed radiographs obtained from the same patient CT set as the first study. Under these idealized conditions, clip localization using two projected images agreed with the results obtained using 3D CT images to within 0.5 mm. This method is now being validated clinically. Full cone-beam CT (CBCT) scans are taken of patients in treatment position. The displacement of markers relative to the prescription CT is measured using both the CBCT scan and paired projection images. Actual clinical images are presented and the achievable margin reduction experimentally established. Smaller PTVs will result in greater numbers of patients eligible for external beam, accelerated partial breast radiotherapy. Research supported in part by Elekta Oncology Systems.