

## AbstractID: 7043 Title: Development of an Immobilization Device for Improving Setup Reproducibility for Patients with Prostate Cancer

**Purpose:** To design the device improving the setup reproducibility of prostate cancer patients during radiation therapy.

**Method and Materials:** A customized device made of polyurethane was designed to immobilize patient's knee, thigh and foot. It was composed of 'Foot rest supine', 'Knee rest supine' and 'Knee rest prone'. 61 patients with prostate cancer were selected and divided into two groups to examine the performance of the devices; patients in one group used immobilization device and patients in the other group did not use that. The setup error was measured with respect to bony landmark in the three axes; medial-lateral (ML), anterior-posterior (AP) and cranial-caudal (CC). 1) The difference between digitally reconstructed radiograph (DRR) and simulation film, 2) the difference between DRR and portal film, and 3) the standard deviation among portal films are measured to evaluate the reproducibility. The setup error over 3 mm and 5 mm were measured. Finally, the results were analyzed statistically by using standard t-test.

**Results:** Without immobilization device, the ML, AP and CC error between DRR and simulation film were  $1.5 \pm 0.9$  mm,  $3.6 \pm 3.6$  mm and  $1.6 \pm 0.9$  mm respectively and between DRR and portal film were  $1.6 \pm 1.2$  mm,  $4.0 \pm 4.1$  mm, and  $4.2 \pm 5.5$  mm respectively. The standard deviations along each axis among the portal films were 1.1 mm, 2.1 mm and 1.0 mm. With immobilization device, the ML, AP and CC error were  $1.3 \pm 1.9$  mm,  $1.8 \pm 1.5$  mm and  $1.1 \pm 1.1$  mm respectively between DRR and simulation film and  $1.0 \pm 1.8$  mm,  $1.2 \pm 0.9$  mm, and  $1.2 \pm 0.8$  mm respectively between DRR and portal film. The standard deviations were 0.9 mm, 1.6 mm and 0.8 mm. The percentage set up error greater than 3 mm and 5 mm were reduced by using immobilization device. The data were statistically significant.

**Conclusion:** The immobilization device improved setup reproducibility and reduced critical set up error.