

AbstractID: 3844 Title: Measurement of cranio-caudal catheter displacement between fractions in CT-based HDR brachytherapy of prostate cancer

Purpose: To measure the cranio-caudal displacement of catheters occurring between consecutive fractions of transrectal ultrasound (TRUS) guided high dose rate (HDR) prostate brachytherapy.

Method and Materials: Ten consecutive patients were treated with 2 fractions of 9.5 Gy TRUS guided HDR brachytherapy using dental putty for the fixation of catheters. For each patient, a CT scan with 3 mm slice thickness was acquired before each of the two fractions. Two different references were employed to measure the catheter displacement between fractions: the ischial bone as a bony marker (BM) and the center of two gold markers (COGM) implanted in the prostate. The catheter displacement was calculated by multiplying the thickness of CT slice with the difference in number of CT slices between the reference slice and the slice containing the tip of a catheter.

Results: The average (range) magnitude of caudal catheter displacement was 4.1 mm: 2.7 mm (-6.0 to 13.5 mm) for BM method and 5.4 mm (-3.75 to 18.0 mm) for COGM method, respectively. The measurement results obtained from BM and COGM methods verified that both prostate movement and catheter displacement independently occurred between fractions. The most anterior and medial two catheters (catheter position 8 and 12) had the greatest tendency to be displaced in the caudal direction because they were located at the most distant position from the fulcrum, susceptible to the rotation of the dental putty in lateral plane due to patient movement between fractions.

Conclusion: The catheter displacement using dental putty for the fixation of catheters is smaller than the conventional technique using pre-fabricated template. The use of both BM and COGM methods for catheter displacement measurement can demonstrate the prostate movement relative to the catheter displacement between fractions.