#163: SBRT FOR LOCALIZED PROSTATE CANCER USING THE RAYPILOT SYSTEM WITH MODIFIED FOLEY CATHETER BASED ON HYPOCATH SYSTEM PERMITTING AREAL-TIME INTRAFRACTION TRACKING PROSTATE MOTION

Georgios Kritselis, M.D.[a], Achilles Ploumidis, MD, BSc, MSc, PhD, FEBU, Head of Urology Department, Athens Medical Group, Athens, Greece D.[b], Athanasios Pappas, MD, FEBU, Consultant Urologist, Athens Medical Group, Athens, Greece , Marinos Tsiatas, MD, PhD, BSc (Biol) Director Medical Oncologist Department of Medical Oncology and Clinical Trials Unit Athens Medical Center. Ioannis Floros Medical Physist, MSc[a] , Katerina Silivridou, MSc[a] , Macarona Sofronia, MSc[a] , Michalis Spyrakos Medical Physist MSc[a],.

From the Departments of Radiation Oncology[a], Surgery[b], and Medical Oncology[c], Athens Medical Center, Athens, Greece.

Background

The UK PACE trials confirmed that 5-fraction SBRT is non-inferior to conventional fractionation for men with prostate cancer. PACE-B demonstrated no significant difference in acute GU and GI toxicity between 36.25 Gy in 5 fractions versus 62 Gy in 20 fractions at 12 weeks post completion of radiotherapy. The PRECISION study further explored 3-fraction ultra-hypofractionation by using the Raypilot system.

Materials and Methods

The RayPilot system enables real-time urethra tracking during linac-based SBRT delivery, potentially reducing acute toxicity through urethra-sparing. A HypoCath which consists of a modified Foley catheter with an embedded transmitter is positioned within the prostatic urethra. The catheter is clearly visible on planning CT and treatment CBCT. Continuous tracking (1Hz frequency) provides precise urethral localization throughout delivery, enabling dose reduction to the urethral PRV to minimize GU toxicity, reduced CTV-PTV margins (3mm uniformly, 2mm posteriorly) while maintaining geometric accuracy, and immediate detection of target displacement beyond 2mm tolerance, triggering beam interruption and position correction.

Results

17 patients (PSA ≤10 ng/ml, Gleason Score ≤7, T2N0M0, IPSS <12) underwent 3-fraction SBRT (prostate ± proximal SV) within 3 years (08/22-08/25), delivering 31.5 Gy to CTV and 28.5 Gy to PTV using the RayPilot system. Treatment employed HypoCath tracking with daily CBCT verification and 2mm intervention threshold. Mean treatment time was 10 minutes per fraction using 6MV FFF VMAT. Real-time tracking (38287 counts) demonstrated geometric stability with 2.78% lateral, 3.72% longitudinal, and 8.51% vertical displacements exceeding the 2mm threshold, requiring beam interruption and position correction. At median 18-month follow-up, no SBRT-related GU or GI toxicity (>2grade) occurred. The HypoCath system was well tolerated.

Conclusions Prostate SBRT using RayPilot/HypoCath tracking is safe and well-tolerated, permitting a urethra-sparing approach that minimizes GU side effects.