Prostate EBRT and I-125 Boost Protocol

Authors: *Dr. Ann Henry, Associate Professor in Clinical Oncology and Dr. Sree Rodda, Consultant Clinical Oncologist, St James Oncology Centre, Leeds Teaching Hospitals NHS Trust & University of Leeds.*

TREATMENT SELECTION

Intent	Radical for patients with T1-T3aN0M0 adenocarcinoma prostate and < 3mm extra-capsular spread on MR. T3b and PSA > 40 patients excluded.	
Primary outcome	5-year PSA control 90%.	
Reference	[1]	
Toxicity	**Acute:** Increased bowel frequency. Urinary urgency, frequency and diminished flow. Dysuria. Haematuria. Tiredness.	**Late:** Impotence, risk 30-50%. Cumulative Incidence of G3 bowel toxicity 8.1%. G3 bladder toxicity 18.4% predominantly urethral stricture. Prevalence of G3 bowel toxicity 1% and G3 bladder toxicity 8.6% at 5 years.
Reference	[1]	
Patient information	‘Radiotherapy to the Prostate’ and ‘Prostate Brachytherapy’.	

SCHEDULING

At least three months of neo-adjuvant hormone manipulation before radiotherapy.

I-125 prostate brachytherapy boost (Phase 1) followed two weeks later by external beam radiotherapy (Phase 2).

PRE-TREATMENT PROCESS

Essential pre-treatment documentation	Clinical history and examination. Histology report. Staging MRI pelvis and isotope bone scan Documented informed consent. Leeds Cancer Centre e-booking document.
Patient positioning	**Phase 1** Lithotomy position under anaesthesia. **Phase 2** Supine, standard kneeblock, standard foam head support, full bladder and rectal enema.
Imaging	**Phase 1** Transrectal ultrasound, with the patient in the lithotomy position. **Phase 2** Non-contrast CT virtual simulation as per radiographer work instruction.
Scan limits	**Phase 1** 1cm superior to base of prostate and 1cm inferior to apex of prostate. **Phase 2** As per work radiographer work instruction.

PRE-TREATMENT PROCESS CONT'D

Target definition

• GTV	Prostate + seminal vesicles.
• PTV_{Brachy}	Prostate and base of seminal vesicles with a 3mm 3D expansion apart from 0mm posteriorly.
• PTV_{EBRT}	GTV with a 10-12mm 3D expansion apart from 8mm posteriorly.

Reference	N/A.
Organs at risk	**Phase 1** Rectum: $D_{2cc} \leq 110$ Gy, $D_{0.1cc} < 150$ Gy Urethra: D_{10} <165%, D_{30} <150% **Phase 2** Rectum: V36.8 Gy ≤ 50%, V46 Gy ≤ 30%. No bladder constraints.
Reference	N/A.
Prescribed dose and fractionation by phase	**Phase 1** I-125 brachytherapy: 110 Gy minimum peripheral dose to the PTV specified according to TG43. **Phase 2** 46 Gy in 23 fractions over 4.5 weeks. D98 > 95% (43.7 Gy), D2 < 105% (48.3 Gy), 99% (45.54 Gy) < D50 < 101% (46.46 Gy).
Reference	[1]
Dose-distribution	Computer planned. **Phase 1** Prescribed to the 100% isodose. Objectives V_{100}prostate > 99.8%, V_{100}PTV > 95%, 55% ≤ V_{150}prostate ≤ 60%, V_{200}prostate < 22% **Phase 2** Prescribed to the ICRU reference point.

TREATMENT

Review	Last week of treatment.
Reference	N/A.
Responsibility	Treating clinician. Specialist nurse/radiographer per protocol.

Reference

[1] WJ Morris, S Tyldesley, S Rodda et al: ASCENDE-RT: An Analysis of Survival Endpoints for a Randomized Trial Comparing a Low-Dose-Rate Brachytherapy Boost to a Dose-Escalated External Beam Boost for High- And Intermediate-Risk Prostate Cancer; Int J Radiat Oncol Biol Phys. (Published online prior to print: DOI: 10.1016/j.ijrobp.2016.11.026).