Dose escalation with HDR brachytherapy for intermediate- and high-risk prostate cancer

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Purpose: Dose escalation by the combined therapy between high-dose-rate brachytherapy (HDRB) plus external beam radiation therapy (EBRT) has reported excellent clinical results, strongly supporting its use in high-risk patients. We present our experience of dose escalation using a single-fraction HDRB for intermediate- and high-risk prostate cancer.

Material and Methods: From August 2010 to September 2015, 332 patients with National Comprehensive Cancer Network intermediate- (n=59) and high-risk (n=273) prostate cancer were enrolled.

- Median age was 71 years (range 46-84).
- The staging was performed using magnetic resonance imaging (MRI) in every case.
- Patients underwent a single-fraction HDRB boost of 15 Gy (n=242) or 9-9.5 Gy HDRB boost respectively.
- All patients received EBRT by Volumetric Arc Therapy (VMAT) with imaging guided by CBCT. A total of 148 patients (45%) received a dose of 46 Gy to the pelvis according to the risk pelvic node involvement by ROACH formula.
- The constraints recommended by GEC/ESTRO have been respected in all brachytherapy plans (Rectum D2cc ≤ 75 Gy; urethra D10 ≤ 120 Gy EQD). GI and GU toxicities were reported according to CTAE v4.0.
- In all, 290 patients (87%) received neo-concomitant and adjuvant androgen deprivation therapy.
- Patients were followed prospectively and the Phoenix definition was used to assess biochemical failure.

Conclusions:
Dose escalation with a single-fraction HDRB is feasible and well tolerated. The profile of acute and late toxicity is acceptable, although a longer follow-up is needed to evaluate long-term outcome and toxicities.

Results:
- The median follow-up was 33 months (range 2-68).
- The 5-year biochemical disease-free survival (bFDS) rate was 90% and overall survival (OS) was 87%.
- Acute genitourinary (GU) toxicity grade 1 and 2 were 37% and 12% respectively, but only 8 patients (2.4%) experienced acute urinary retention (Grade 3). Acute gastrointestinal (GI) toxicity grade 1 and 2 were 16% and 6% respectively. No grade 3 or 4 GI toxicity was observed.
- Late GU toxicity ≥ grade 3 included 7 patients (2.1%), and the incidence of late GI toxicity ≥ grade 3 was 1% (3 patients) compatible with rectal radiation proctopathy.

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