Prostate HDR Treatment Brachytherapy Planning - Considering Different Imaging Modalities

Introduction – J Prisciandaro
Ultrasound based – Z Chang
CT based – J Zoberi
MRI based – F Mourtada

Prostate Cancer

• Treatment Options:
  ▫ Surgery (Radical prostatectomy)
  ▫ Radiation therapy
  ▫ Hormone therapy

• Choice of treatment modality(s) dependent on:
  ▫ Stage
  ▫ PSA
  ▫ Gleason score

Radiotherapy Options

• External beam
  ▫ 3D conformal photon therapy
  ▫ Intensity Modulated Radiotherapy
  ▫ Stereotactic Body Radiotherapy
  ▫ Proton therapy

• Brachytherapy
  ▫ Low dose rate (LDR)
  ▫ High dose rate (HDR)
Combination Therapy

- Several institutional series\(^1\)\(^2\) as well as the ASCENDE-RT\(^3\) randomized trial (intermediate and high risk) have suggested an improvement biochemical control in patients receiving EBRT + LDR.
  - Additional follow-up is needed to evaluate metastasis-free survival, prostate cancer-specific mortality, and overall survival.
- A similar effect is expected for patients receiving EBRT + HDR, but clinical data is sparse.\(^4\)

3. http://meetinglibrary.asco.org/content/141698-159
4. Smolska-Ciszewska et al., Radiation Oncology, 2015, 10:60.

HDR vs. LDR Brachytherapy

**Advantages**
- Reduced exposure to staff
- No exposure to families and friends
- Ability to shape dose cloud
- Ability to cover base of SV
  - Source migration not an issue
- Reusable source
- Potential biologic advantage with HDR brachytherapy

**Disadvantages**
- Higher initial investment
- Multiple fractions require hospitalization
- Needle migration documented with multiple fraction implants
- More labor intensive
  - Relatively complicated treatment system – more interlocks. QA process much more difficult.

HDR Imaging/Planning Options
1. CT based prostate HDR

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2. US based prostate HDR

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3. MRI based prostate HDR

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