Radiotherapy for Prostate Cancer and Sexual Functioning

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Nothing to Disclose
Erectile Dysfunction after Radiotherapy

Incidence

• 1: 40-50%
• 2: 20%
• 3: 80%

• Incidence after external-beam radiotherapy same as after brachytherapy
  Yes/no

• Higher fractions increase erectile dysfunction
  Yes/no
External-Beam Radiotherapy (EBRT)

- Introduction of linear accelerators
- Till mid 1980s, conventional techniques
- 3 dimensional-conformal radiotherapy (3D-CRT)
- Intensity-modulated radiotherapy (IMRT)
- Image-guided techniques (IGRT)
- Stereotactic radiation
- Protons
EBRT for Prostate Cancer
45 no baseline data
29 HT
n=194
CKVO 96-10 trial
268 pts

Questionnaire at baseline, 6 mos, 1, 2 & 3 yrs
OUTCOMES AFTER INTENSITY-MODULATED VERSUS CONFORMAL RADIOTHERAPY IN OLDER MEN WITH NONMETASTATIC PROSTATE CANCER


a) Bowel Complications

b) Urinary Complications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rate per 100 person-years</th>
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<tbody>
<tr>
<td></td>
<td>IMRT vs conformal RT (CRT)</td>
</tr>
<tr>
<td>Morbidity</td>
<td></td>
</tr>
<tr>
<td>GI morbidity</td>
<td>14.7</td>
</tr>
<tr>
<td>Hip fractures</td>
<td>1.0</td>
</tr>
<tr>
<td>Erectile dysfunction</td>
<td>5.3</td>
</tr>
<tr>
<td>Oncological efficacy</td>
<td></td>
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<tr>
<td>Additional cancer therapy</td>
<td>3.1</td>
</tr>
</tbody>
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The HYPRO Trial

n=820, 2007-2010
19x3.4 Gy vs 39x2 Gy
Intermediate-high risk PCa.

Sexual Function After Hypofractionated Versus Conventionally Fractionated Radiotherapy for Prostate Cancer: Results From the Randomized Phase III HYPRO Trial

Ruud C. Wortel, MD, Floris J. Pos, MD, PhD, Wilma D. Heemsbergen, PhD, and Luca Incrocci, MD, PhD

J Sex Med 2016 13:1695-703
n=32
ED increased from 38% at baseline to 71% post-radiation (p=0.02)
Protons

- Initial sites uveal melanomas, skull base tumors
- Reduced risk of secondary malignancies (by 26-39%)
- Costs often exceed 100,000 USD in the US
- Installation costs 100-200 millions USD
- A few studies (about 1600 pts) on PCa.
Results: Median follow-up for the cohort was 7.1 years; 7-year biochemical-free survival was 97.8%. Eight men (one high-risk, five intermediate-risk and two low-risk) experienced biochemical progression, including one who died of disease 9 years after treatment. Potency (erections firm enough for sexual intercourse) was 90% at baseline and declined to 72% at the first-year follow-up, but declined to only 67% at 5 years. Only 2% of patients developed urinary incontinence requiring pads. The bowel habits mean score declined from a baseline of 96 to 88 at 1 year, which improved over the following years to 93 at 5 years.
Brachytherapy and Prostate Cancer

- Selected patients
- High-dose rate (HDR) with Ir192
- Low-dose rate (LDR) with Pd103 or I125
- Excellent biochemical control
- Reduced side effects
Long-term erectile function following permanent seed brachytherapy treatment for localized prostate cancer

Wee Loon Ong, Benjamin R. Hindson, Catherine Beaufort, Paul Pharoah, Jeremy L. Millar

Radiotherapy and Oncology 112 (2014) 72–76
Rectal spacer?

A

**EPIC Sexual Composite Score Over Time for those with Mild/No Sexual Dysfunction at Baseline**

We observed that 70% of men maintained erectile function at 1 year and 57% at 3 years in both arms of the study. Recently a population-based analysis using EPIC

Hamstra et al. Pract Radiat Oncol 2018;8:e7-15

n=88, EPIC
Radiation-induced erectile dysfunction: Recent advances and future directions

Javed Mahmood PhD a, Aksinija A. Shamah MSc a, T. Michael Creed MSc a, Radmila Pavlovic BSc a, Hotaka Matsu MD, PhD b, Masaki Kimura MD, PhD c, Jason Molitoris MD, PhD a, Hem Shukla PhD d, Isabel Jackson PhD a, Zeljko Vujaskovic MD, PhD a, *

Advances in Radiation Oncology (2016) 1, 161-169
DOSE-VOLUME PARAMETERS OF THE CORPORA CAVERNOSA DO NOT CORRELATE WITH ERECTILE DYSFUNCTION AFTER EXTERNAL BEAM RADIOThERAPY FOR PROSTATE CANCer: RESULTS FROM A DOSE-ESCALATION TRIAL

Gerard J. van der WieLen, M.D.,* Mischa S. Hogeman, Ph.D.,* Gert R. DohLe, M.D., Ph.D.,† Wim L.J. van Putten, M.Sc.,‡ and Luca Incrocci, M.D., Ph.D.*


Fig. 2. Average absolute dose–volume histograms (DVH) of the crura, the superiormost 1-cm segment of the crura and the penile bulb of patients with and without erectile dysfunction (ED) at 2 years after external beam radiotherapy. The error bars indicate 1 standard deviation. No statistically significant differences were found between the dose–volume parameters and ED (Kruskal-Wallis test).
Changes in the Penile Arteries of the Rat after Fractionated Irradiation of the Prostate: A Pilot Study

Gerard J. van der Wielen, MD,† Marcel Vermeij,‡ Bas W.D. de Jong, PhD,‖ Maarten Schuit, MD,⋆ Johannes Marijnissen, PhD,§ Dik J. Kok, PhD,‖ Wytske M. van Weerden, MSc, PhD,‡ and Luca Incrocci, MD, PhD●

J Sex Med 2009;6:1908–1913

Figure 1 A schematic picture of the anatomy of the prostate, rectum, bladder, and penis of the rat and the radiation field.

Table: Changes in the penile arteries of the rat after fractionated irradiation of the prostate.
ED and Radiotherapy for Prostate Cancer

**Summary**

- Incidence: 40%
- Onset: 1-3 years
- Arterial injury, arterial occlusion and cavernosal arterial insufficiency
- Endothelial dysfunction and structural alterations in corporal smooth muscles
- Distal pudendal arteries, crurae are at risk
- Vascular risk factors to be considered (DM, hypercholesterolemia, smoking...)

Other Sexual Complaints

- Decreased/loss of ejaculation
  2-56%
- Pain during orgasm
  3-11%
- Diminished libido
  8-53%

Incrocci et al., IJROBP 2002
Sildenafil and ED after EBRT for PCa

Successful intercourse attempts

*\(p<0.001\)

Incrocci et al., IJROBP 2001
Tadalafil and ED after EBRT for PCa

Results

Has the treatment you have been taking led to successful intercourse?

Incrocci et al., IJROBP 2006
ICI, penile implants, vacuum devices
World Meeting on Sexual Medicine

September 16-19, 2020
Yokohama, Japan
Greater Tokyo Area

Save the Date

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