

## Hip Prosthetics are Not a Contraindication to Stereotactic Body Radiation Therapy for Localized Prostate Cancer: Treatment Characteristics and Long-Term Clinical Outcomes

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### Abstract

Published 02/11/2022

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**Categories:** Radiation Oncology, Urology

**Keywords:** stereotactic body radiotherapy, hip prosthetics, prostate cancer

### How to cite this abstract

Blacksburg S, Sheu R, Carpenter T, et al. (February 11, 2022) Hip Prosthetics are Not a Contraindication to Stereotactic Body Radiation Therapy for Localized Prostate Cancer: Treatment Characteristics and Long-Term Clinical Outcomes. Cureus 14(2): a788

## Abstract

**Objective:** Hip replacement is a common orthopaedic surgery in the aging population. In CT imaging, the metal of hip prosthetics (HP) can cause considerable beam hardening and streak artifact. Due to their proximity to pelvic organs, HP has the potential to compromise CT visualization of the prostate and adjacent tissues. Metal Artifact Reduction (MAR) software and MR imaging has the potential of minimizing these visual impairments. While several studies have characterized the growing use of Stereotactic Body Radiation Therapy (SBRT) to treat men with prostate cancer, its utilization in men with HP is poorly understood. To our knowledge, this is the first study to explore its application in this population with long-term clinical data.

**Methods:** 3339 patients with localized prostate cancer received robotic SBRT at an academic center from April 11, 2006 to November 25, 2019. By NCCN groupings, patient had low (21.7%), favorable intermediate (23.2%), unfavorable intermediate (35.9%), and high (19.1%) risk disease. 2893 (86.8%) treatments consisted of a 5-fraction regimen of 35.0-36.25 Gy while 441 (13.2%) involved pelvic irradiation (median dose 45Gy) followed by 3 fraction SBRT as boost (19.5-21Gy). Androgen deprivation Therapy (ADT) was prescribed in 828 (24.9%) cases. When possible, patients underwent MR imaging for treatment planning, along with Metal Artifact Reduction use at CT simulation. Biochemical outcome was scored using the Phoenix definition. Pearson chi-square testing was applied to categorical inputs and survival curves were compared using the Kaplan-Meier method.

**Results:** 45 (1.3%) patients had a history of HP; 43 had one hip replacement, while 2 had bilateral. There was no difference in the use of MR imaging for treatment planning (92.5% vs. 94.8%, p=ns) in patients with HP. On average, patients with a history of HP were older (mean 70.3 vs. 67.8 years, p=.032), and were more likely to be prescribed anti-coagulation (26.7% vs. 11.1%, p=.003) and statin medicines (48.9% vs. 33.0%, p=.021) prior to treatment. There was no difference in ADT use or pelvic irradiation between groups. The lone dosimetric difference was maximum bladder point dose, with HP patients having a lower risk of the bladder receiving >39.0Gy (8.8% vs. 23.2%, p=.03). Biochemical control rates were equivalent across NCCN risk stratification grouping. For patients with HP, there was no difference in the 7-year freedom from grade 2+ proctitis (100% vs. 95.3%, p=ns) or grade 2+ genitourinary toxicity (87.5% vs. 92.2%, p=ns).

**Conclusion:** Patient history of hip replacement surgery is not a contraindication to prostate SBRT. Due to CT artifact from metal, it is plausible that bladder maximum dose points can be under-represented. With the use of MAR software and treatment planning MRI, there is overall dosimetric parity in patients without HP. This finding is clinically supported by no appreciable impact of hip prosthetics on biochemical control rates or long-term toxicity post prostate SBRT.