

Phase 2 Multicenter Trial of Heterogeneous-dosing Stereotactic Body Radiotherapy for Low- and Intermediate-risk Prostate Cancer: 5-year Outcomes

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Background: Stereotactic body radiation therapy is an emerging treatment for prostate cancer (PC), with potential biological and oncologic advantages. A well-established radiation dosing schedule (38 Gy in 4 fractions) has shown excellent long-term efficacy in high-dose-rate (HDR) brachytherapy.

Objective: To report 5-yr efficacy, toxicity, and quality-of-life (QOL) outcomes of a novel 4-d SBRT regimen.

Design, setting, and participants: This was a single-arm prospective phase 2 trial involving 259 patients with low- or intermediate-risk PC treated at 18 US centers from December 2007 to February 2012. The median follow-up was 5 yr (interquartile range 37–85 mo).
Intervention: SBRT with 38 Gy in four fractions; radiation plans mimicked HDR brachytherapy dosimetry.

Outcome measurements and statistical analysis: We measured freedom from biochemical recurrence (BCR) and assessed toxicities using the Common Terminology Criteria for Adverse Events v3.0 and QOL using the Expanded Prostate Cancer Index Composite.

Results and limitations: The 5-yr BCR-free rates were 100% and 88.5% for patients with low- and intermediate-risk PC, respectively. The cumulative 5-yr grade 2, 3, and 4 toxicity rates were 12.4%, 1.9%, and 0.4% for urinary, and 3.4%, 0%, and 0% for gastrointestinal toxicities, respectively. The median baseline prostate-specific antigen (PSA) level of 5.12 ng/ml decreased to 0.1 ng/ml by ≥ 42 mo. QOL scores decreased at 1 mo but returned to baseline by 6 mo, with a later decline (≥ 24 mo) in the urinary continence domain (pad use was 2% at baseline and 10% at 5 yr), and lower sexual potency over time. Comparative outcomes versus other types of radiotherapy are difficult because the trial was not randomized.

Conclusions: This regimen yields a high rate of BCR-free survival, with a very low median PSA nadir suggesting prostate ablation. For properly selected patients with low- or intermediate-risk PC who choose SBRT, this treatment regimen is effective.

Patient summary: This potent four-treatment stereotactic body radiotherapy regimen appears to be effective for patients with early prostate cancer.

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Largest Prostate SBRT Studies to Date Show Accuray CyberKnife® System Provides Excellent Prostate Cancer Survival Rates in Five or Fewer Sessions

September 26, 2018

Recently Published Data Demonstrate Benefits of CyberKnife Treatment for Both Low- and Intermediate-Risk Patients at Five Years Post-Treatment

San Francisco, CA USA (UroToday.com) -- Accuray Incorporated announced that published data from two prospective, multi-center studies using differing protocols provide consistent results and reinforce the use of the CyberKnife® System for the effective management of low- and intermediate-risk prostate cancer. These studies are the largest conducted to date evaluating stereotactic body radiation therapy (SBRT) in patients with localized prostate cancer. The studies were recently published online in the [International Journal of Radiation Oncology*Biophysics](#) and in the [European Urology Oncology](#).

The CyberKnife System delivers radiation with sub-millimeter precision, enhancing clinicians' ability to treat effectively while preserving healthy tissue. In addition to clinical benefits, SBRT is more convenient for patients and has been shown to be less costly than long courses of intensity-modulated radiation therapy (IMRT).

Growing clinical evidence suggests that dose-escalation may translate into improved clinical outcomes for prostate cancer. Research suggests that, unlike most tumors, prostate cancer cells are highly sensitive to the amount of radiation dose delivered per fraction or treatment session. In recent years, this has led clinicians to consider hypo-fractionated schedules—the delivery of a higher dose per fraction in fewer fractions than conventional schedules—with promising results. SBRT, which combines a high degree of targeting accuracy with very high doses of extremely precise, externally-delivered radiation over four to five sessions, provides an option for accomplishing this goal.

Highlights of the Multi-Center Studies

Pinpoint precision results in exceptional survival rates

Prostate SBRT administered by the system resulted in the following disease-free survival rates:

- 97% - 100% for low-risk patients
- Superior to the 92% - 94% from conventional radiation therapy historic data
- Equivalent to low dose rate (LDR) brachytherapy and high dose rate (HDR) brachytherapy without the inconvenience and risk associated with invasive seed and catheter implants
- 88% - 97% for intermediate-risk patients
- Equal to or higher than the 85% - 90% reported with conventional radiation therapy without the inconvenience of daily visits over several weeks

Minimal toxicity even with high radiation dose

Despite the high dose delivered to the prostate, side effects were uncommon (less than two percent grade 3 or higher toxicities) and were similar to other radiation therapy procedures without the need for invasive rectal balloons or spacers to spare the rectal wall.

"Our study treated over 300 prostate cancer patients across 21 centers throughout the United States. The CyberKnife's unique architecture tracks and automatically corrects for prostate motion, delivering radiation with sub-millimeter accuracy. This exceptional precision allowed us to give a more effective dose of radiotherapy, which translated into superior cancer control. Since we were able to avoid the healthy tissues which lie immediately adjacent to the prostate, side effects were uncommon," said Robert M. Meier, MD, medical director of the Swedish Radiosurgery Center in Seattle and lead investigator of the study published in the *International Journal of Radiation Oncology*Biography*Physics*.

Added Donald B. Fuller, MD, a radiation oncologist at Genesis Healthcare Partners in San Diego and lead investigator of the *European Urology Oncology* study, "We evaluated an SBRT dosing regimen designed to emulate successful high dose rate (HDR) brachytherapy plans and delivered in four visits. Study outcomes demonstrate that CyberKnife@prostate SBRT is safe and effective for low- and intermediate-risk prostate cancer patients, producing a lower PSA nadir level than previously reported with other external radiotherapy techniques (< 0.1 ng/mL at 4 years and beyond), with minimal impact on quality of life during and after treatment. Of note, our treatment plans required steep dose fall-off from high-dose regions close to the bladder, urethra and rectum that would be difficult to deliver safely without the unique continual image-guidance and automatic correction of the beam aim made possible by the CyberKnife System."

"These multi-center studies reinforce the value the CyberKnife System can bring to a hospital's prostate cancer treatment program and its potential to change the way the disease is treated by many physicians," said Fabienne Hirigoyenberry-Lanson, PhD, Vice President Global Medical and Scientific Affairs, at Accuray. "The system enables clinical teams to achieve their treatment objectives while providing a cost-effective, non-invasive option that is more convenient for patients. More than 20,000 prostate cancer patients have been treated with the CyberKnife System, clearly demonstrating the importance of these benefits to healthcare professionals and patients alike."

SOURCE Accuray Incorporate