

CyberKnife® Stereotatic Radiosurgery for the Treatment of Localized Prostate Cancer

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Objective(s): Hypofractionated, high-dose approaches to prostate radiotherapy have been theorized to be important given the unique radiobiology of prostate cancer cells. Here we report our experience using robotic radiosurgery to deliver high-dose treatment minimally invasively.

Methods: Since February 2005, 201 patients with localized prostate cancer were treated with CyberKnife® stereotactic radiosurgery. Patients had biopsy-proven adenocarcinoma of the prostate with clinical stage T1cN0M0 to T2cN0M0. Most patients had Gleason score of 3+3 or 3+4, initial PSA ranged from 1.1 to 25.5 ng/ml, and initial prostate volume ranged from 15.5 cc to 109 cc. Some patients received neoadjuvant hormonal therapy. Implanted gold fiducials were used for image-guided targeting and tracking. CT/MRI scans were used to identify the gross tumor volume (GTV), which included the prostate and the proximal seminal vesicles. The planning target volume (PTV) included the GTV and a 5- mm margin in each direction except near the rectum where the margin was 3 mm. Patients received 3500 cGy to 3755 cGy, administered in 5 fractions. Follow-up evaluations (PSA levels and toxicity evaluations) were arranged frequently just after treatment and every 3 months for 2 years, and every 6 months thereafter.

Results: All patients experienced a reduction in PSA levels during the 12 months post-treatment. At a median follow-up of 18 months, 2 patients treated at the lower dose experienced a biochemical recurrence (at X and Y months) that was confirmed by biopsy. Acute side effects were generally mild and resolved shortly after treatment. A single Grade 3 rectal bleed occurred as was managed surgically. Ninety percent of patients who were sexually active before treatment maintained good erectile function.

Conclusion: The CyberKnife System was capable of delivering high-dose, hypofractionated radiotherapy for prostate cancer in a minimally invasive fashion, with excellent short-term PSA response and very low levels of complications.