

Experience of Prostate High Dose Rate Brachytherapy Program at the John B. Amos Cancer Center

Introduction

Therapeutic outcomes in localized prostate cancer are commonly dependent on local control of the primary malignancy. Furthermore, risk of distant failure is also related to the local control. It is established that higher radiation doses to the prostate gland are associated with better control rates. Thus, techniques that safely provide radiobiologic dose escalation have been associated with better therapeutic ratios, particularly in intermediate- and high-risk disease. High Dose Rate (HDR) prostate brachytherapy is well-described in the literature and is now listed as a viable option for dose escalation in the National Comprehensive Cancer Network (NCCN) guidelines. It typically is used in combination with external beam radiation but can be used as monotherapy in select cases. Advanced technologies allow for the effective delivery of this treatment while minimizing risk of significant morbidity.

The prostate HDR brachytherapy program began here at JBACC in 2013. This is a review of our experience. This study will review our compliance with guidelines (appropriate patient selection, adherence to accepted technique) and patient safety.

Method

We reviewed cases of patients treated with prostate HDR brachytherapy at JBACC since the program's inception in 2013 and 2014. This time period was selected to allow for at least one year of follow up to evaluate acute and late toxicities as well as response to therapy. Patients selected were AJCC stage II-A and II-B consistent with the NCCN guidelines. Of the 65 stage II patients treated in 2013, 9 were treated with HDR. All of these patients were treated in combination with external beam RT and HDR as a boost (dose escalation). In 2014, 16 out of the 69 patients with stage II prostate cancer were treated with HDR. One patient was appropriately selected to receive prostate HDR as monotherapy. All procedures were conducted with one experienced urologist. Patients were typically assessed within the first 3 months for acute toxicity and approximately one year after implant for late toxicity. The Common Terminology Criteria for Adverse Events (CTCAE 4.0) for GU/GI (Genitourinary/Gastrointestinal) was used to describe side effects (i.e., urinary frequency, urgency, retention, nocturia, diarrhea, stool frequency, constipation). Serologic response was measured using Prostate Specific Antigen (PSA) according to guidelines.

Results

There were no peri-operative complications in any of the cases of 2013 and 2014. Radiation treatment planning was performed according to guidelines using Oncentra brachytherapy software. All patients in 2013 received 50.4 Gy with conventional fractionation via external beam RT followed by prostate HDR

brachytherapy (21Gy over 2 applications) as a boost. Only one patient had acute grade 2 urinary retention requiring temporary placement of a Foley catheter in 2013. This was subsequently discontinued. The remaining patients only had grade 1 (mild) GU/GI toxicities that improved. There were no grade 2 late toxicities. Two patients were lost to follow up and did not have their serologic response evaluated at one year: one patient simply did not return and the other had the discovery of an unrelated ascending colon cancer within three months after RT. The remaining 7 patients had positive response to therapy.

In 2014, 13 patients received combination treatment with external beam (50.4 Gy with conventional fractionation) followed by HDR brachytherapy boost (21 Gy over 2 applications). One patient received combination external beam (45Gy) followed by a single HDR implant (15Gy in single application) due to enrollment on a national protocol. One patient received HDR monotherapy (27 Gy over 2 applications). And one patient received combination external beam (50.4 Gy) but received only one HDR application (10.5 Gy) as he refused the second procedure due to anxiety. He only had grade I GU toxicity. 3 patients developed grade 2 GU acute toxicity requiring temporary placement of a Foley catheter. These were subsequently discontinued without issue. The remaining 13 patients only had grade 1 toxicities. Again, there were no grade 2 late toxicities. All 16 patients had demonstrated serologic response in PSA during the one-year follow up period.

Discussion

Prostate HDR brachytherapy is described in the literature as an effective technique with good efficacy and an acceptable toxicity profile. It should be performed in appropriately selected patients at a program with advanced technology and trained staff to optimize the therapeutic ratio (benefit greater than risk). This strategy is supported by the American Brachytherapy Society guidelines and the NCCN as an acceptable option for treating localized prostate cancer. Our experience demonstrates comparable findings to the growing body of evidence supporting HDR prostate as a viable technique in appropriate cases. Working with a dedicated urologist with experience in this technique and adherence to standards has been useful to reduce the risk of complications.

This study is limited by the retrospective design and the relative small numbers. Furthermore, longer follow up and additional cases will be needed to further evaluate the efficacy and safety of this technique in our program.

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