ELSEVIER

BRACHYTHERAPY

Brachytherapy 12 (2013) 338–342

Case Report

# Permanent seed brachytherapy for locally recurrent prostate cancer after radical prostatectomy: A case report and review of the literature

Miren Gaztañaga, Juanita Mary Crook*

*Department of Radiation Oncology, British Columbia Cancer Agency, Center for the Southern Interior, University of British Columbia, Kelowna, British Columbia, Canada*

**ABSTRACT**

**PURPOSE:** To describe the management of a patient with locally recurrent prostate cancer in the prostate bed, 10 years after a radical prostatectomy.

**METHODS AND MATERIALS:** A 71-year-old man had a radical prostatectomy for a Gleason 7 clinical T2a carcinoma of the prostate in 2000. Final pathologic stage was pT3a pN0. Postoperatively his prostate-specific antigen was undetectable, but by 2008 it was 1.0 ng/mL and in 2011 it reached to 1.43 ng/mL. He was referred for consideration of salvage radiotherapy. Staging workup was negative but transrectal ultrasound revealed a 15 cc recurrence in the prostate bed. A combination of external beam radiation therapy (4600/23/4.5 weeks to the pelvis) and a brachytherapy boost (115 Gy) was selected for definitive management. Androgen ablation was not used.

**RESULTS:** The treatment was well tolerated. The brachytherapy boost was planned in a similar fashion to a *de novo* implant for an intact prostate. The postimplant dosimetry was evaluated using magnetic resonance imaging-computed tomography (MR–CT) fusion and appeared satisfactory. Acute toxicity was minimal. Six months after brachytherapy, the prostate-specific antigen had fallen from 1.43 to 0.05 ng/mL.

**CONCLUSIONS:** Dose escalation with combined external beam and brachytherapy may be feasible if recurrent disease can be visualized using transrectal ultrasound and encompassed in an implanted volume. Although longer followup and a larger series of patients are required to demonstrate safety and efficacy, consideration should be given this approach. 

*Keywords:* Prostatic neoplasms; Salvage radiotherapy; Interstitial brachytherapy; Permanent seed brachytherapy; Radiation therapy; Brachytherapy; Salvage; Local recurrence after radical prostatectomy

## Introduction

Radical prostatectomy is an effective treatment option for localized prostate cancer, and is considered by many to be the gold standard. However, adverse pathologic features are not uncommon. More than 30% of specimens will be found to have positive surgical margins, seminal vesicle involvement, and/or extracapsular extension (1–9). Up to 50% of patients with these adverse pathologic risk factors will subsequently have a recurrence, most commonly presenting as biochemical failure, but 17% will eventually die of prostate cancer within 15 years of surgery (10–16).

In the scenario of a palpable or biopsy-proven local recurrence after surgery, treatment options are limited. Salvage cryosurgery has unacceptable morbidity (17), and failure rates of up to 60% (18). High-intensity focused ultrasound has also been used as a salvage treatment with failure rates around 50% (19, 20). The role of salvage radiotherapy after prostatectomy has been demonstrated in retrospective studies, and in a multi-institutional pooled data analysis (21) and in a comprehensive review of published studies (22). The dose that can be delivered safely is limited by the proximity of the rectum and consequently the chance of successful control of disease falls off rapidly with prostate-specific antigen (PSA) >1 ng/mL at the time of salvage.

Randomized trials have demonstrated not only an advantage in freedom from disease, but also an improvement in

Received 28 February 2012; received in revised form 19 April 2012; accepted 20 April 2012.

Conflict of interest: Neither author has a conflict of interest to report regarding the subject matter of this article.

* Corresponding author. Department of Radiation Oncology, British Columbia Cancer Agency, Center for the Southern Interior, University of British Columbia, 399 Royal Avenue, Kelowna, British Columbia V1Y5L3, Canada. Tel.: +1-250-712-3979; fax: +1-250-712-3911.

*E-mail address:* jcrook@bccancer.bc.ca (J.M. Crook).

1538-4721/$ - see front matter 
http://dx.doi.org/10.1016/j.brachy.2012.04.006

overall survival when adjuvant radiotherapy is given postoperatively to men with adverse pathology (23). Nonetheless, many patients are still not referred appropriately, or may have had their surgery at a time when these data were not yet available, as is the case in this report. By the time the PSA is >1 ng/mL and a local recurrence palpable, the patient may be quite elderly. Salvage external beam radiotherapy with or without androgen ablation is the current standard of care (24). Dose escalation, if it can be delivered safely, achieves higher rates of biochemical relapse free survival (25). The combination of external beam radiation therapy (EBRT) and brachytherapy is a possible option for escalating the dose.

The present report describes a case of a patient with a palpable local recurrence of prostate cancer postprostatectomy, treated with a combination of EBRT and brachytherapy.

## Methods and materials

A 71-year-old patient was referred for consideration of salvage radiotherapy for a rising PSA 11 years after radical prostatectomy. He had been diagnosed in 2000 with a PSA of 7.1 ng/mL and found to have a cT2a, Gleason 7 (3 + 4) prostate cancer with positive biopsies at the right base and right midgland. In July 2000, he had a radical retropubic prostatectomy. The final pathology showed a pT3a pN0 tumor with positive margins at the bladder base and infiltration through the capsule. There was no infiltration of the periprostatic fat or involvement of the seminal vesicles. Bilateral obturator nodes removed were negative for disease.

Postoperatively he had full return to continence, although he had recurrent problems with an anastomotic stricture, which required periodic dilatation after which he would experience a minor degree of leaking. His International Prostate Symptom Score was 4 of 35 at the time of referral. He had complete and permanent erectile dysfunction after surgery. His PSA was undetectable (<0.05 ng/mL) in 2001 and subsequently rose steadily, with a doubling time of 71 months (5.92 years), being 1.0 ng/mL in 2008, 1.23 ng/mL in 2010, and 1.43 ng/mL in 2011. At that point, a locum urologist performed a digital rectal examination revealing an indurated plaque on the right side of the prostate bed highly suspicious for recurrent local disease. Staging bone scan and CT scan of the abdomen and pelvis were clear and he was referred for consideration of salvage radiotherapy.

The patient was sent for a transrectal ultrasound (TRUS) for fiducial placement at the anastomosis and a request for biopsies of anything appearing suspicious on TRUS. The ultrasound demonstrated a sizable local recurrence in the prostate bed; measuring 3.4 × 3.9 × 1.4 cm, described as very similar in appearance to an intact prostate (Fig. 1). Biopsies (labeled as right and left, base, mid, and apex) demonstrated recurrent prostate cancer Gleason 3 + 4 in 6 out of 7 cores taken, with 97% of the biopsy tissue being cancerous.

Taking into consideration the bulk of disease and the patient's desire to avoid the use of androgen ablation, it was decided to proceed with a combined treatment of EBRT and a brachytherapy boost to the recurrence. At the time of TRUS mapping, it was not possible to pass a 14 French catheter for the instillation of aerated gel into the urethra. The patient was sent back to the referring urologist for another anastomotic dilatation. He then proceeded with three-dimensional conformal EBRT to the prostate bed and pelvic lymph nodes delivering 46 Gy in 23 daily fractions. The treatment with EBRT was well tolerated with no acute toxicity. The patient returned 4 weeks later for the permanent seed brachytherapy implant, performed under TRUS and fluoroscopic guidance. The prescription dose was 115 Gy. Eighteen needles were used to deposit 57 stranded $^{125}$I seeds (activity 0.358 U) according to the preplan (Fig. 2). The procedure was tolerated well without complications.

Postimplant imaging was performed on Day 30, including both a CT scan of the pelvis and an MRI (Fig. 3), using 2- and 3-mm slices, respectively. The two image sets were electronically fused using the seeds as fiducials, matching the CT-visualized seeds to the seed voids on MRI. Soft tissues were contoured on the MRI, including the clinical target volume (CTV), rectum, and urethra. Dose–volume histograms were generated to determine the dosimetric parameters.

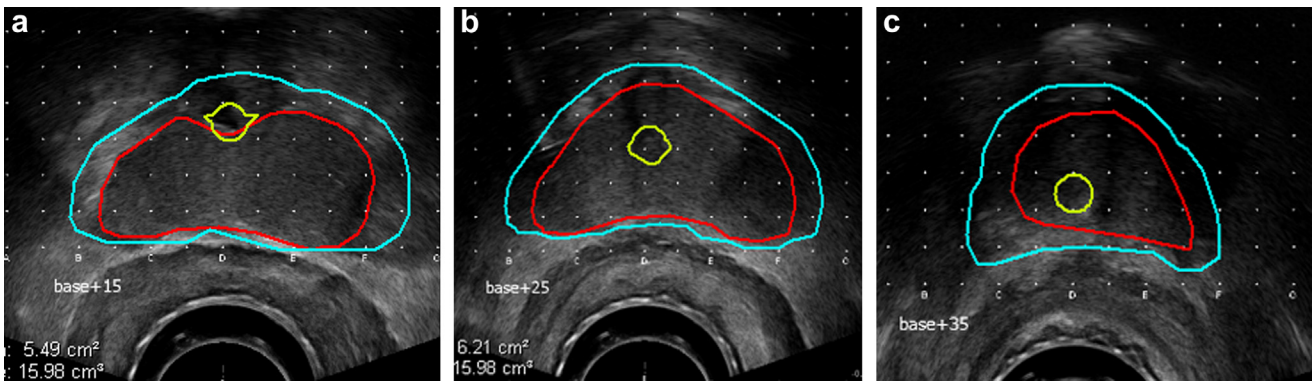


Fig. 1. Three images from TRUS mapping showing (a) the base + 15 mm, (b) base + 25 mm, and (c) base + 35 mm (apex). TRUS = transrectal ultrasound.