

PSA Bounce Phenomenon after LDR Brachytherapy Using Permanent ^{125}I Iodine Seeds Implantation

C. Dudu¹, M. Hârza¹, C. Toader¹, B. Hăineală¹, A. Preda¹, L. Domnișor¹, C. Baston¹, M.F. Rădulescu², I. Sinescu¹

¹ Center for Urology and Renal Transplantation, Fundeni Clinical Institute, Romania

² Saarbrücken, Germany

Introduction and Objectives. Prostate-specific antigen levels after brachytherapy may fluctuate and increase temporarily without a clear reason in some of the successfully treated men. The phenomenon is called "PSA bounce" and it was first described in 1997 by Wallner et al. The purpose of the study is to evaluate PSA levels at the 60 month follow-up after prostate brachytherapy - permanent prostate implant with ^{125}I , for patients with and without PSA bounce phenomenon.

Materials and Methods. Between October 2006 and December 2011, a total of 168 patients with prostate cancer were treated with permanent ^{125}I implantation brachytherapy, in stage T1c-T2a. PSA bounce is defined as a temporary increase in PSA value followed by a consecutive decrease recorded with the same value before the increase or a lower value.

Results. The average magnitude of the bounce was 0.8 ng/ml with values between 0.1 and 4.1 ng/ml. Mean time to bounce was 17 months. At the 60-month follow-up, 83% of patients had PSA values lower than 1 ng/mL and 17% higher than 1 ng/mL.

Conclusions. A bounce definition of a rise ≥ 0.2 ng/mL is a reliable definition, to use as a threshold. PSA bounce is a common phenomenon after prostate brachytherapy and should be always considered whenever we have a patient with rising PSA after implant.

Key-words: brachytherapy, prostate cancer, PSA bounce, biochemical failure.

Correspondence to: Dr. Catalin Dudu M.D.

Fundeni Clinical Institute, Center for Urology and Renal Transplantation
258 Fundeni Str., sector 2, code 022328, Bucharest, Romania
Tel/Fax: 021 275 07 00
E-mail: ecdudu@yahoo.com

Introduction and Objectives

Prostate-specific antigen levels after brachytherapy may fluctuate and increase temporarily without a clear reason in some of the successfully treated men. The phenomenon is called “PSA bounce” and it was first described in 1997 by Wallner et al. It often degenerated in anxiety on the part of the patient and physician because it may meet the definition of relapse after treatment. To accurately predict a subsequent clinical failure, a biochemical failure must be differentiated from a PSA bounce. According to the EAU guidelines biochemical failure is considered when the PSA value increases with at least 2 ng/mL above the nadir^[1,2]. The purpose of the study is to evaluate PSA levels at the 60 month follow-up after prostate brachytherapy - permanent prostate implant with ¹²⁵I, for patients with PSA bounce phenomenon, without PSA bounce phenomenon and with biochemical failure.

Materials and Methods

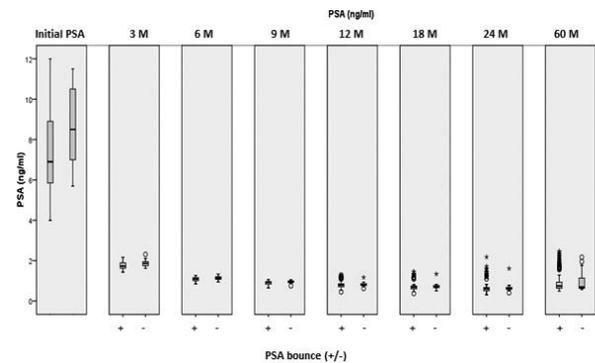
Between October 2006 and December 2011, a total of 168 patients with prostate cancer were treated with permanent ¹²⁵I implantation brachytherapy, as monotherapy. Only patients with favorable prognostic criteria according with ABS recommendations (stage T1c-T2a, Gleason < 7, PSA < 10 ng/ml) were included. In all cases, the prostate volume was smaller than 60 cm³, IPSS < 8, Qmax > 12 ml/s and TUR-P was not performed at least 6 months prior to brachytherapy. Androgen deprivation was administered for gland volume reduction (3 months) in 13 cases and was interrupted post-seeds implantation. Transrectal ultrasound-guided prostate brachytherapy with transperineal implantation of ¹²⁵I was performed in lithotomy position, under general anesthesia. Dosimetric planning of the implant was determined for all patients before seed insertion by computer software (PSID). We used Interstrand sources, with medium activity of 0.708 mCi/seed and total body activity of 35 mCi/patient. The prescribed dose for monotherapy was 145 Gy. The prostate volume was in average 34.83cm³ at the time of implantation. We implanted between 10 and 30 needles, with an average of 16.36 needles and between 22 and 75 sources, with an average of 43.7. The PSA bounce was defined as an increase in PSA more than 0.2 ng/mL above the nadir level and without exceeding the threshold for biochemical failure. We analyzed the PSA trend at the 60-month follow-up in relation with being part of one of the following groups: with PSA bounce phenomenon, without PSA bounce phenomenon and with biochemical failure^[3-6].

Results

PSA bounce phenomenon was recorded in 31 patients (18.4%), with a mean occurrence of 17 months. The highest value recorded during PSA bounce phenomenon was 4.1 ng/mL. The value of PSA nadir < 0.2 ng/ml was achieved in 63% of cases.

We noticed that the PSA values at the 24-month and 60-month follow-ups was higher in the case of patients that recorded a bounce phenomenon and lower in the case of those that did not had a PSA bounce, with a mean difference of 0.6 ng/mL.

Also, 9 of the 12 patients that eventually had a biochemical failure had a recorded PSA bounce phenomenon after brachytherapy. Correlated to the initial Gleason score, most of the patients that recorded a biochemical failure had an initial Gleason score of 6 (8 out of 12 patients), 3 (3 out of 12 patients), 7 (1 patient) and no patients with failure and Gleason score 4.



| | | Biochemical failure | | Total |
|-------------|------------------|---------------------|--------|--------|
| | | No | Yes | |
| Gleason 4.0 | Count | 8 | 0 | 8 |
| | % within Gleason | 100.0% | 0.0% | 100.0% |
| 5.0 | Count | 45 | 3 | 48 |
| | % within Gleason | 93.75% | 6.25% | 100.0% |
| 6.0 | Count | 103 | 8 | 111 |
| | % within Gleason | 92.8% | 7.2% | 100.0% |
| 7.0 | Count | 0 | 1 | 1 |
| | % within Gleason | 0.0% | 100.0% | 100.0% |
| Total | Count | 156 | 12 | 168 |
| | % within Gleason | 93.0% | 7.0% | 100.0% |

Discussions

A bounce definition of a rise ≥ 0.2 ng/mL is a reliable definition, to use as a threshold, the frequency of

PSA bounce after brachytherapy has varied from 13% to 49%, and out observed rate of 18% lies within this range. Patients who have had a PSA bounce have inferior rates of biochemical failure free survival to those patients who have not had a PSA bounce. The time to the first rise in PSA after brachytherapy is an important discriminator between a PSA bounce and a biochemical failure, in that a PSA rise that corresponds to a bounce usually occurs much earlier than a PSA rise that corresponds to a biochemical failure^[7].

Conclusions

Prostate-specific antigen bounce is an important clinical challenge that affects about 20% of patients treated with brachytherapy alone. A bounce definition of a rise ≥ 0.2 ng/mL is a reliable definition, to use as a threshold. The time to first PSA rise after brachytherapy is the most valuable factor for distinguishing bounce and biochemical failure. PSA bounce is a common phenomenon after prostate brachytherapy and should be always considered whenever we have a patient with rising PSA after implant.

References

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