PSA Course after Definitive High-dose Radiotherapy of Localized Prostate Cancer

PATRICK SCHÜLLER¹, ULRICH SCHÄFER¹, OLIVER MICKE¹, JOAN E. PANKE² and NORMANN WILLICH¹

¹Klinik und Poliklinik für Strahlentherapie – Radioonkologie, Universitätsklinikum Münster, Albert-Schweitzer-Strasse 33, 48129 Münster;
²Medizinischer Dienst de Krankenversicherung (MDK) Hamburg, Hammerbrookstrasse 5, 20097 Hamburg, Germany

Abstract. Aim: After radical prostatectomy, PSA levels that reach near zero values in less than 14 days are associated with a favourable prognosis. The aim of this analysis was to investigate whether PSA also declines to near zero values after combined tele-brachytherapy. Materials and Methods: Forty-one patient, treated with combined tele-brachytherapy for prostate cancer, were followed for at least 2 years after treatment with repeated PSA measurements. Results: PSA values <1.0 ng/ml were only reached after 15 months; near zero PSA levels were not reached until 18-24 months after treatment (median: 0.25 ng/ml). Conclusion: A PSA decline to near zero values occurs after definitive tele-brachytherapy, but it takes longer than after surgery (18-24 months).

Adenocarcinoma of the prostate is the most common malignant disease and the third most common cause of cancer-related death in males (6). Radical prostatectomy has been the main therapy for early tumour stages for several decades. However, definitive radiotherapy is increasingly gaining importance, especially as an alternative in early tumour stages (T1-T2) and elderly patients (1). The value of additional hormonal therapy is still unclear, although it appears that certain subgroups benefit from it (2). As we have shown previously, PSA monitoring is very useful for predicting and analyzing the treatment outcome in patients receiving adjuvant treatment after radical prostatectomy, where PSA levels that reach near zero values in less than 14 days are associated with a favourable prognosis (4). The aim of this analysis was to investigate whether the desirable PSA decline to near zero values occurs in patients treated with definitive radiotherapy (combined tele-brachytherapy).

Materials and Methods

Patients. Forty-one patients, treated between January 1995 and January 2002, were included in this study. All patients underwent definitive radiotherapy for organ-confined adenocarcinoma of the prostate. The age of the patients ranged from 54 to 77 years, with a median of 69 years. Staging evaluation included medical history and physical examination, computed tomography and magnetic resonance imaging of the pelvis, bone scan and chest X-ray. Pelvic lymph node sampling was only done when the risk of lymph node metastases was higher than 15% according to the Partin tables (3). The median pre-treatment PSA level was 8.7 ng/ml (maximum: 38 ng/ml). Gleason scores ranged from 4 to 9 with a median of 6.

Radiotherapy technique. All patients received three-dimensional conformal external beam radiation using 15 MV photons using a three-dimensional, conformal multiple field technique (Figure 1). A total dose of 59.4 Gy was delivered to the target volume in daily fractions of 1.8 Gy. The patients were treated 5 days per week, all fields each day. The planning target volume was defined by the prostate with a 1 cm safety margin. The seminal vesicles were included if affected.

One to two weeks after teletherapy, the patients received an additional ultrasound-guided HDR brachytherapy boost of 10 Gy using Ir-192 interstitial afterloading with 8-12 needles, delivered to the first surrounding isodose (Figure 2).

Hormonal therapy. In a few patients, hormonal therapy was used to shrink a large prostate prior to irradiation. After radiotherapy, patients only received hormonal therapy in the event of a recurrence.

Statistical evaluation. Pre-irradiation (pre-RT) and periodic post-irradiation (post-RT) PSA levels for each patient were entered into a database. Pre-RT PSA levels were measured immediately before...
the first irradiation. Post-RT PSA levels were acquired every 3 months for the first 2 years, every 6 months until the fifth year and annually thereafter. Total PSA was determined using CPE PSA 2-US (CIS). After April 1996, Immulite PSA (DPC) was used. The criterion for disease relapse was two successively rising PSA values during follow-up. Disease-free survival curves were calculated using the Kaplan-Meier method. All analyses were performed with the help of the SPSS statistical software package.
Forty-one patients were entered into this study. The median pre-RT PSA level was 8.7 ng/ml. Two months after radiotherapy, the median PSA levels fell to 2.3 ng/ml. The changes of PSA are shown in Figure 3. Values <1.0 ng/ml were only reached after 15 months; near zero PSA levels were not reached until 18-24 months after treatment (median: 0.25 ng/ml). Acute and late side-effects were light to moderate with RTOG grade 3-4 proctitis and cystitis occurring in 0% (acute) and 5% (late), respectively. Details of side-effects are shown in Tables I and II.

Discussion

After radical prostatectomy with adjuvant radiotherapy, PSA levels can reach near zero values in less than 14 days after treatment. A fast decline is associated with a favourable prognosis (4).

The results from our present analysis show that a PSA decline to near zero values also routinely occurs after definitive tele-brachytherapy, indicating that organ-preserving treatment also results in complete biochemical remission. This decline, however, takes a much longer time than after surgical treatment (4) and reaches its end-point only after 18-24 months. These results may suggest that local high-dose radiotherapy is equally effective as radical surgical resection (5).

Conclusion

A PSA decline to near zero values routinely occurs after definitive tele-brachytherapy, but it takes longer than after surgery (18-24 months).

References


Received August 2, 2004
Accepted February 8, 2005