Establishment of the optimal follow-up schedule after radical prostatectomy

Kazuhito Matsumoto, Seiya Hattori, Naoya Niwa, Takeo Kosaka, Ryuichi Mizzuino, Toshikazu Takeda, Eiji Kikuchi, Hiroshi Asanuma, Mototsugu Oya
Keio University School of Medicine, Department of Urology, Tokyo, Japan

Abstract

Objective

Monitoring the serum level of prostate specific antigen (PSA) is indispensable for surveillance after radical therapy in order to identify the patients who might need additional treatment for recurrence. However, unnecessarily intensive PSA follow-up could increase medical expenses and the burden.

Methods

We retrospectively reviewed the clinicopathological data of 1,010 consecutive patients who underwent radical prostatectomy between 1995 and 2008. After we excluded patients who received neoadjuvant/adjuvant therapy and those without a nadir PSA level <0.2 ng/mL, the remaining 779 patients were enrolled. Biochemical recurrence (BCR) was defined as elevation of PSA to >0.2 ng/mL. PSA-DT following BCR was calculated with a formula that employs the natural logarithm of 2 divided by the slope obtained from fitting linear regression of the natural log of PSA to time. Patients were divided into five groups by setting multiple cut points at clinically convenient times of 1, 2, 3, 5, years after surgery. The start time of this study was the date of radical prostatectomy, and Kaplan-Meier curves were drawn to examine postoperative BCR-free survival. The PSA-DT showed a log-normal distribution, and the Shapiro-Wilk normality test gave a p value of 0.923 (Figure 1). In this study, the minimum PSA-DT was set as the one-sided lower 95% confidence limit. We considered that the ideal PSA range for detection of BCR should be set at 0.2 to 0.4 ng/mL in order to start salvage treatment before PSA exceeds 0.5 ng/mL. Therefore, the optimal (safe) follow-up interval was calculated by estimating the timing when PSA would reach 0.4 ng/mL based on the minimum (fastest) PSA-DT.

Conclusions

The PSA-DT following BCR varied according to the timing after radical prostatectomy. Our data on minimum PSA-DTs after BCR are useful for setting the optimal follow-up schedule that is both necessary and sufficient.

Objectives

Radical prostatectomy is widely performed as the primary treatment for clinically localized prostate cancer and recurrence is most commonly diagnosed by detecting asymptomatic elevation of the serum level of prostate specific antigen (PSA). Therefore, monitoring serum PSA is essential for surveillance after radical therapy in order to identify patients who might need additional treatment for recurrence. Since early salvage therapy for recurrence achieves unnecessary intensive PSA monitoring is undesirable, considering both medical costs and the burden on physicians and patients. The PSA doubling time (PSA-DT) is defined as the number of months it takes for the PSA level to double from a baseline value. Elevation of PSA after surgery is thought to reflect growth of the residual tumor, so the PSA-DT for the PSA level to double from a baseline value. Elevation of PSA after surgery can be used to estimate future PSA values.

This in study, in order to determine the optimal interval for measurement of PSA after surgery, we focused on the PSA-DT following BCR at various times after radical prostatectomy.

We retrospectively reviewed the clinicopathological data of 1,010 consecutive patients who underwent radical prostatectomy between 1995 and 2008. We excluded patients who received neoadjuvant/adjuvant therapy and those without a nadir PSA level <0.2 ng/mL. The remaining 779 patients were enrolled in this study. Biochemical recurrence (BCR) was defined as elevation of PSA to >0.2 ng/mL. We focused on the BCR rate and the PSA-DT following BCR at various times after radical prostatectomy. The PSA-DT following BCR was calculated with a formula that employs the natural logarithm of 2 divided by the slope obtained from fitting linear regression of the natural log of PSA to time. Patients were divided into five groups by setting multiple cut points at clinically convenient times of 1, 2, 3, 5, years after surgery. The start time of this study was the date of radical prostatectomy, and Kaplan-Meier curves were drawn to examine postoperative BCR-free survival. The PSA-DT showed a log-normal distribution, and the Shapiro-Wilk normality test gave a p value of 0.923 (Figure 1). In this study, the minimum PSA-DT was set as the one-sided lower 95% confidence limit. We considered that the ideal PSA range for detection of BCR should be set at 0.2 to 0.4 ng/mL in order to start salvage treatment before PSA exceeds 0.5 ng/mL. Therefore, the optimal (safe) follow-up interval was calculated by estimating the timing when PSA would reach 0.4 ng/mL based on the minimum (fastest) PSA-DT.

The annual BCR rate was 6% in the first year after surgery, 6% between 1-2 years, 3% between 2-3 years, 1% between 3-5 years, and 2% at > 5 years. The 2-, 5-, and 10-year BCR-free survival rates were 89%, 81%, and 73%, respectively.

Conclusions

The minimum PSA-DTs after BCR at various times after surgery.

We retrospectively reviewed the clinicopathological data of 1,010 consecutive patients who underwent radical prostatectomy between 1995 and 2008. We excluded patients who received neoadjuvant/adjuvant therapy and those without a nadir PSA level <0.2 ng/mL. The remaining 779 patients were enrolled in this study. Biochemical recurrence (BCR) was defined as elevation of PSA to >0.2 ng/mL after radical prostatectomy. To detect BCR, PSA was generally measured at 3-month intervals for the first two years after surgery, at 6-months intervals for the next three years, and annually thereafter. We focused on the BCR rate and the PSA-DT following BCR at various times after radical prostatectomy. PSA-DT was calculated with a formula that employs the natural logarithm of 2 divided by the slope obtained from fitting linear regression of the natural log of PSA to time. Patients were divided into five groups by setting multiple cut points at clinically convenient times of 1, 2, 3, 5, years after surgery. The start time of this study was the date of radical prostatectomy, and Kaplan-Meier curves were drawn to examine postoperative BCR-free survival. The PSA-DT showed a log-normal distribution, and the Shapiro-Wilk normality test gave a p value of 0.923 (Figure 1). In this study, the minimum PSA-DT was set as the one-sided lower 95% confidence limit. We considered that the ideal PSA range for detection of BCR should be set at 0.2 to 0.4 ng/mL in order to start salvage treatment before PSA exceeds 0.5 ng/mL. Therefore, the optimal (safe) follow-up interval was calculated by estimating the timing when PSA would reach 0.4 ng/mL based on the minimum (fastest) PSA-DT.

The annual BCR rate was 6% in the first year after surgery, 6% between 1-2 years, 3% between 2-3 years, 1% between 3-5 years, and 2% at > 5 years. The 2-, 5-, and 10-year BCR-free survival rates were 89%, 81%, and 73%, respectively.

Conclusions

The minimum PSA-DTs after BCR at various times after surgery.

We retrospectively reviewed the clinicopathological data of 1,010 consecutive patients who underwent radical prostatectomy between 1995 and 2008. We excluded patients who received neoadjuvant/adjuvant therapy and those without a nadir PSA level <0.2 ng/mL. The remaining 779 patients were enrolled in this study. Biochemical recurrence (BCR) was defined as elevation of PSA to >0.2 ng/mL after radical prostatectomy. To detect BCR, PSA was generally measured at 3-month intervals for the first two years after surgery, at 6-months intervals for the next three years, and annually thereafter. We focused on the BCR rate and the PSA-DT following BCR at various times after radical prostatectomy. PSA-DT was calculated with a formula that employs the natural logarithm of 2 divided by the slope obtained from fitting linear regression of the natural log of PSA to time. Patients were divided into five groups by setting multiple cut points at clinically convenient times of 1, 2, 3, 5, years after surgery. The start time of this study was the date of radical prostatectomy, and Kaplan-Meier curves were drawn to examine postoperative BCR-free survival. The PSA-DT showed a log-normal distribution, and the Shapiro-Wilk normality test gave a p value of 0.923 (Figure 1). In this study, the minimum PSA-DT was set as the one-sided lower 95% confidence limit. We considered that the ideal PSA range for detection of BCR should be set at 0.2 to 0.4 ng/mL in order to start salvage treatment before PSA exceeds 0.5 ng/mL. Therefore, the optimal (safe) follow-up interval was calculated by estimating the timing when PSA would reach 0.4 ng/mL based on the minimum (fastest) PSA-DT.

The annual BCR rate was 6% in the first year after surgery, 6% between 1-2 years, 3% between 2-3 years, 1% between 3-5 years, and 2% at > 5 years. The 2-, 5-, and 10-year BCR-free survival rates were 89%, 81%, and 73%, respectively.

Conclusions

The minimum PSA-DTs after BCR at various times after surgery.

We retrospectively reviewed the clinicopathological data of 1,010 consecutive patients who underwent radical prostatectomy between 1995 and 2008. We excluded patients who received neoadjuvant/adjuvant therapy and those without a nadir PSA level <0.2 ng/mL. The remaining 779 patients were enrolled in this study. Biochemical recurrence (BCR) was defined as elevation of PSA to >0.2 ng/mL after radical prostatectomy. To detect BCR, PSA was generally measured at 3-month intervals for the first two years after surgery, at 6-months intervals for the next three years, and annually thereafter. We focused on the BCR rate and the PSA-DT following BCR at various times after radical prostatectomy. PSA-DT was calculated with a formula that employs the natural logarithm of 2 divided by the slope obtained from fitting linear regression of the natural log of PSA to time. Patients were divided into five groups by setting multiple cut points at clinically convenient times of 1, 2, 3, 5, years after surgery. The start time of this study was the date of radical prostatectomy, and Kaplan-Meier curves were drawn to examine postoperative BCR-free survival. The PSA-DT showed a log-normal distribution, and the Shapiro-Wilk normality test gave a p value of 0.923 (Figure 1). In this study, the minimum PSA-DT was set as the one-sided lower 95% confidence limit. We considered that the ideal PSA range for detection of BCR should be set at 0.2 to 0.4 ng/mL in order to start salvage treatment before PSA exceeds 0.5 ng/mL. Therefore, the optimal (safe) follow-up interval was calculated by estimating the timing when PSA would reach 0.4 ng/mL based on the minimum (fastest) PSA-DT.

The annual BCR rate was 6% in the first year after surgery, 6% between 1-2 years, 3% between 2-3 years, 1% between 3-5 years, and 2% at > 5 years. The 2-, 5-, and 10-year BCR-free survival rates were 89%, 81%, and 73%, respectively.

Conclusions

The minimum PSA-DTs after BCR at various times after surgery.