Prostate

Refining the definition of biochemical failure in the era of stereotactic body radiation therapy for prostate cancer: The Phoenix definition and beyond

Ma TM, Roy S, Wu X, Mantz C, Fuller D, Miszczyk L, Napieralska A, Namysł-Kaletka A, Bagshaw HP, Buyyounouski MK, Glicksman R, Loblaw DA, Katz A, Upadhyaya SK, Nickols N, Steinberg ML, Philipson R, Aghdam N, Suy S, Pepin A et al

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BACKGROUND AND PURPOSE

The Phoenix definition for biochemical failure (BCF) after radiotherapy uses nadir PSA (nPSA) + 2.0 ng/mL to classify a BCF and was derived from conventionally fractionated radiotherapy, which produces significantly higher nPSAs than stereotactic body radiotherapy (SBRT). We investigated whether an alternative nPSA-based threshold could be used to define post-SBRT BCFs.

MATERIALS AND METHODS

PSA kinetics data on 2038 patients from nine institutions were retrospectively analysed for low- and intermediate-risk PCa patients treated with SBRT without ADT. We evaluated the performance of various nPSA-based definitions. We also investigated the relationship of relative PSA decline (rPSA, PSA18month/PSA6month) and timing of reaching nPSA + 2 with BCF.

RESULTS

Median follow-up was 71.9 months. BCF occurred in 6.9% of patients. Median nPSA was 0.16 ng/mL. False positivity of nPSA + 2 was 30.2%, compared to 40.9%, 57.8%, and 71.0% for nPSA + 1.5, nPSA + 1.0, and nPSA + 0.5, respectively. Among patients with BCF, the median lead time gained from an earlier nPSA + threshold definition over the Phoenix definition was minimal. Patients with BCF had significantly lower rates of early PSA decline (mean rPSA 1.19 vs. 0.39, $p < 0.0001$) and were significantly more likely to reach nPSA + 2 ≥ 18 months (83.3% vs. 21.1%, $p < 0.0001$). The proposed criterion (rPSA ≥ 2.6 or nPSA + 2 ≥ 18 months) had a sensitivity and specificity of 92.4% and 81.5%, respectively, for predicting BCF in patients meeting the Phoenix definition and decreased its false positivity to 6.4%.

CONCLUSION

The Phoenix definition remains an excellent definition for BCF post-SBRT. Its high false positivity can be mitigated by applying additional criteria (rPSA ≥ 2.6 or time to nPSA + 2 ≥ 18 months).