

Purpose: To determine the incidence and to identify clinical, treatment and dosimetric parameters associated with the development of urethral strictures following permanent prostate brachytherapy.

Materials and Methods: From April 1995 through May 2003, 1186 consecutive patients underwent permanent prostate brachytherapy for clinical stage T1b-T3a NxM0 (2002 AJCC) prostate cancer. Nine hundred and twelve patients (76.9%) were implanted with Pd-103 and 204 (23.1%) with I-125. The median follow-up was 4.3 years. Follow-up was calculated from the date of implantation. Clinical, treatment and dosimetric parameters evaluated for bulbomembranous urethral strictures included patient age, prostate volume, the use of supplemental XRT, isotope, androgen deprivation therapy (ADT), duration of ADT, prostate V100/150/200, D90, prostatic urethral dose (mean, median and maximum), bulbomembranous urethral dose (mean, median and maximum), tobacco use, hypertension, diabetes and BMI.

Results: Twenty-nine patients developed brachytherapy-induced strictures and all occurred within the first 5 years following brachytherapy. All strictures involved the bulbomembranous urethra. The 9-year actuarial risk of bulbomembranous urethral strictures was 3.6% with a median time to development of 34 months. The radiation dose to the bulbomembranous urethra was significantly greater in patients with strictures than those without ($p < 0.001$). In addition, the urethral dose 15 mm distal to the prostate apex was significantly greater in patients with strictures ($p < 0.001$). In multivariate analysis, only the bulbomembranous urethral dose and the duration of ADT (> 6 months) predicted for the development of a urethral stricture. All patients were successfully managed by either a urethral dilatation or internal optical urethrotomy.

Conclusions: Brachytherapy-related urethral strictures are related to overaggressive implantation of the periapical region and prolonged (> 6 months) treatment with ADT. Careful attention to preplanning and intraoperative execution, along with the judicious use of ADT, is essential to minimize the incidence of brachytherapy-related strictures.