Purpose/Objective(s): We investigated the positioning reproducibility of serrated gold coils (Visicoil™) implanted within the prostate glands of patients undergoing definitive external beam radiotherapy for prostate cancer.

Materials/Methods: Radiopaque Visicoils™ of diameter 0.75 mm and median length 3 cm (range 2-4 cm) were implanted, one into each lobe of the prostate glands of 30 patients planned for external beam treatment. A transperineal approach with ultrasound guidance was used. The coils were visualized on treatment planning CT scans performed before therapy (SIM) and again after 25 fractions of treatment (5 weeks, W5). For localization purposes five points were specified along the length of each coil. For each patient the SIM and 5WK scans were fused using a computer algorithm that mapped these specified points from the SIM scan onto the 5WK scan. The magnitude and direction of changes in relative coil positions from the original CT scan were determined.

Results: Data from 30 patients were studied, of whom 19 also received androgen ablation therapy. The average change in the distance between the two coils over 5 weeks of treatment was 1.0 mm (+/- 0.6 mm), with a maximum of 2.5 mm in one patient. Average residual errors (standard deviations) for the positions of individual coil segments after 5 weeks of therapy were only 0.5 mm LR, 0.6 mm AP, and 0.4 mm IS. For all parameters tested, differences between patients undergoing and those not undergoing hormonal therapy were not statistically significant.

Conclusions: In this study of 30 patients, the average change in distance between the coils over 5 weeks of treatment, at 1.0 mm with a maximum of 2.5 mm, compared favorably with published data regarding marker seed stability.¹ One study, for example, demonstrated an average seed migration of 1.2 mm, with a maximum change in inter-seed distance during a course of therapy greater than 6 mm in a pool of only 10 patients.² Possible volume changes due to androgen ablation treatment did not significantly affect Visicoil™ fiducial accuracy. Overall, excellent stability of the implanted Visicoil™ was observed, with average residual errors (standard deviations) of 0.4-0.6 mm in the AP, lat, and sup-inf directions. These data lead us to expect that at treatment planning the safety margins needed to account for coil position uncertainty, encompassing 95% of cases (two standard deviations), would be less than two millimeters.


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