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Hemi-gland brachytherapy for unilateral prostate cancer

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Background: Brachytherapy, which is a definitive modality for prostate cancer, have been considered to be applied to focal therapy due to its adjustability of the treatment area and dose intensity. Focal brachytherapy with tissue preservation strategy to prostate cancer could be associated with better genitourinary functional outcome and cost effectiveness. Based on the high predictive ability of unilateral prostate cancer using extended biopsy and MRI(Matsuoka Y et al, Eur Urol, in press), we applied hemi-gland brachytherapy to unilateral prostate cancer patients as focal therapy.

Patients and Methods: The eligible criteria for hemi-gland brachytherapy are as follows: unilateral cancer proven by cores positive for cancer within a unilateral lobe using extended prostate biopsy combined with transperineal and transrectal approaches and no cancerous lesion in the contralateral lobe detected by MRI; clinical stage T2a or less; Gleason score 7 or less; maximum cancer length less than 10 mm; and prostate specific antigen (PSA) value less than 20 ng/ml. I125 seeds were implanted to the target lobe up to the midline as defined by the urethra to deliver a dose of 160 Gy under real-time ultrasonographic guidance. Patients were followed up using serial PSA tests and MRI. Genitourinary functional outcomes were assessed using International Prostate Symptom Score (IPSS), International Index of Erectile Function - 5 (IIEF-5), and Expanded Prostate Cancer Index Composite (EPIC). The protocol was approved by our institutional ethics committee.

Results: Beginning in 2010, 18 prostate cancer patients among who met the criteria received hemi-gland brachytherapy, with a median follow up period of 12 months (range 3 to 30 months). The median age was 72 years (range 63 to 81 years) with a median PSA level of 7.4 ng/ml (range 4.8 to 16.4 ng/ml). Of the men, 10 patients (55)% had low risk and 8 (45)% had intermediate risk cancer. After treatment, no severe acute complications, such as urinary retention or bleeding, were observed. Urinary function evaluated by IPSS (median baseline value, 9) and EPIC urinary domain (baseline median 90) worsened initially after seed implantation at 3 to 6 months although it recovered to baseline levels or lower by 12 months.. IIEF-5 scores did not show significant change although baseline scores were low (median, 9). PSA values significantly decreased without biochemical failure according to Phoenix definition. There was no evidence of residual or new lesions as assessed by MRI at 12 months. All patients alive except one who died from an unrelated cause.

Conclusions: We demonstrate the application of brachytherapy to focal therapy for prostate cancer patients. Based on the initial results, hemiablativ brachytherapy can be a treatment option in focal therapy for unilateral prostate cancer in patients selected using extended biopsy and MRI.