

Focal Laser Ablation of Prostate Cancer: Feasibility of Magnetic Resonance Imaging–Ultrasound Fusion for Guidance

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Abstract

Purpose: Focal laser ablation is a potential treatment in some men with prostate cancer. Currently focal laser ablation is performed by radiologists in a magnetic resonance imaging unit (in bore). We evaluated the safety and feasibility of performing focal laser ablation in a urology clinic (out of bore) using magnetic resonance imaging-ultrasound fusion for guidance.

Materials and methods: A total of 11 men with intermediate risk prostate cancer were enrolled in this prospective, institutional review board approved pilot study. Magnetic resonance imaging-ultrasound fusion was used to guide laser fibers transrectally into regions of interest harboring intermediate risk prostate cancer. Thermal probes were inserted for real-time monitoring of intraprostatic temperatures during laser activation. Multiparametric magnetic resonance imaging (3 Tesla) was done immediately after treatment and at 6 months along with comprehensive fusion biopsy.

Results: Ten of 11 patients were successfully treated while under local anesthesia. Mean procedure time was 95 minutes (range 71 to 105). Posttreatment magnetic resonance imaging revealed a confined zone of nonperfusion in all 10 men. Mean zone volume was 4.3 cc (range 2.1 to 6.0). No CTCAE grade 3 or greater adverse events developed and no changes were observed in urinary or sexual function. At 6 months magnetic resonance imaging-ultrasound fusion biopsy of the treatment site showed no cancer in 3 patients, microfocal Gleason 3 + 3 in another 3 and persistent intermediate risk prostate cancer in 4.

Conclusions: Focal laser ablation of prostate cancer appears safe and feasible with the patient under local anesthesia in a urology clinic using magnetic resonance imaging-ultrasound fusion for guidance and thermal probes for monitoring. Further development is necessary to refine out of bore focal laser ablation and additional studies are needed to determine appropriate treatment margins and oncologic efficacy.