Purpose: The new in vivo dosimetry tool, RADPOS, combines MOSFET dosimetry with an electromagnetic positioning sensor. It has recently been modified to include a MOSFET array rather than a single MOSFET for dose monitoring at five points along the detector axis. The detector is in use as part of a clinical trial which is the first to measure both urethral dose and internal motion concurrently during permanent seed implantation for prostate brachytherapy using a single probe.

Methods:The RADPOS detector was secured inside a Foley catheter inside the patient's urethra. Spatial coordinates of the RADPOS detector were read every 0.5 s and the timing of events such as needle insertion was noted. MOSFET readings were taken over two ten minute periods once all seeds had been implanted both before and after the TRUS probe was removed.

Results:Locations of the dosimeters could be inferred using a marker located at the end of the detector wire which is visible on fluoroscopy images. Although detector position varied slightly between patients, on average one dose point was inside the bladder, two/three dose points were within the prostatic urethra, and one/two dose points were at or inferior to the apex of the prostate. Maximum integral dose in the prostatic urethral ranged from 110-195 Gy, and it was found that the dose can change up to 63 cGy depending on whether the rectal probe is in place. The average change in displacement from the beginning of the procedure to the end for all patients was Δr=(5.5 ± 2.2) mm, with changes in individual coordinates of Δx (right/left) = (0.1-2.6) mm, Δy (superior/inferior) = (0.3-8.7) mm, and Δz (anterior/posterior) = (1.2-5.0) mm.

Conclusions:The modified RADPOS is a powerful tool that can provide accurate real time dose and position information for use during prostate brachytherapy.

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