

The ultrasound guided intra-operative inverse-optimization PSI program has been adapted since 2002. It has very comparative target conformality with reduced urethra and rectal dose.

Urologist placed the needles around the peripheral zone of the prostate, and two to four more needles were also inserted in the interior volume but away from urethra. Varian VariSeed 7.0 was used for the procedure. Transverse ultrasound images were acquired every 5 mm with needles in place. Inverse optimization of dose distribution was performed based on the constraint pre-designed. The optimization results were carefully reviewed to patch dose in some specific disease sites. Oncologist then dropped the seeds guided by implant view of VariSeed using a Mick applicator.

The day 30 CT plan results are very encouraging, the mean $V100_{prostate}$ is 95.8%, and $D90$ is 169.8 Gy; target conformality is excellent. The mean $V150_{urethra}$ is 11.5%, the way lower than the publication of 30%. The mean $V110_{rectum}$ is 0.64 cc., again, superior compared with published data of 1.5 c.c.

Patient follow-up outcome was very encouraging as well, 61% of patients had RTOG GU grade 0 and 1, 39% had grade 2, none for grade 3 and 4. Similarly, 97% of patients had RTOG GI grade 0 and 1, 3% had grade 2, none for grade 3 and 4.

The US-IOIO procedure might require lots of physics knowledge at the initial program setup, however, after the learning curve with proper guidance, it is a very promising approach with great benefit to patients' quality of life.