AbstractID: 3511 Title: Inversely planned catheter positions for high dose rate brachytherapy of the prostate

Purpose: To determine the dosimetric impact of the number of catheters used in prostate HDR brachytherapy and to evaluate the possibility of reducing the number currently used clinically.

Method and Materials: Our in-house inverse planning optimizes the catheter positions based on clinical objectives such as prostate dose coverage, dose homogeneity and urethra protection. This optimization displaces straight catheters on a 5 mm grid searching for the best pattern. The number of catheters is fixed, only their positions and the dwell times are optimized. For one prostate, 8 implants were generated with different number of catheters (5, 6, 8, 10, 12, 14, 16 and 18).

Results: Implants with more than 10 catheters shows equivalent dosimetric indices with good dose coverage (V100>95%) and low dose delivered to the urethra (V120<5%). With less than 10 catheters the implant dosimetry deteriorates rapidly. The protection of the urethra from high dose (V150=0) is independent of the number of catheters. This demonstrates that decent dose coverage can be achieved with a reduced number of catheters without affecting the urethra protection. The optimization tends to produce implants with peripherally loaded catheters and manages to produce adequate dose coverage with just a few catheters in the middle part of the prostate close to the urethra.

Conclusion: This study encourages the diminution of the number of catheters implanted around the urethra, improving the urethra protection and facilitating the implant procedure. This is only true when using an inverse planning to optimize the dwell times. Centers that are performing the treatment planning without an inverse planning need these central catheters to produce adequate dose coverage. This demonstrates that inverse planning brings the possibility to safely reduce the number of catheters currently used in prostate HDR brachytherapy.

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