Purpose: Permanent seed implantation is more and more used in the management of localised prostate cancer as an alternative to radical prostatectomy and to transcutaneal radiotherapy (3D-conformational and IMRT). In fact, several authors have published long-term results that, expressed as disease free survival, vary from 85 to 90% for low risk patients [1]. Post implant CT-based dosimetry has become the gold standard for implant evaluation as it is the only method for assessing the quality of permanent prostate brachytherapy and the actual dose delivered to the prostate and the normal surrounding structures. As a consequence of our constant evaluation of the implants during one year experience, pre and post implantation dosimetric results are presented.

Methods and Materials: 35 patients, with intracapsular tumor, prostatic gland volume < 40 cc, PSA < 10 ng/ml, Gleason score < 7, maximum urinary flux > 12 ml/s and post-micturition residual < 50 cc were treated with transperineal I-125 preplanned brachytherapy (Rapid Strand, Amersham Health). 125-I seeds (model 6711 – NIST 99) with activity ranging from 0.414 to 0.450 mCi/source were used. The prescription does was 145 Gy to the planning target volume (97% of the prostate volume valued by means of US images). For both pre-planning and post-implant dosimetry the Prowess 3D 3.10 version software was used (Alliant Medical Technologies). A post-implant assessment was performed one month after implant taking 5 mm abutting CT slices, with pixel dimension of 0.3 mm (FOV of 150 mm) in order to maximize spatial resolution. The urethral location was estimated by use of a Foley catheter filled with a contrast medium injected directly in the bladder through the catheter itself. The contrast medium permits also to distinguish the base of the prostate from the bladder. The total number of seeds implanted is cross checked with the number of seeds counted on orthogonal X-ray films taken at the end of the implant.

The D90, V100, V150 and V90 values and the volumes of the prostate from both planned and post-implant dosimetry were compared for all patients.

Results: For pre-planned dosimetry, the mean values for D90, V100, V90 and V150 values are respectively: 178 Gy, 98.5%, 99.5%, 65.7%. For post-implantation, these values become respectively: 123 Gy, 82.7%, 85.9%, 53%. The average percentage difference between the prostate volumes valued pre and post-implantation is 16.1%. The planned mean activity per volume is: 1 mCi/cc.

Discussion and Conclusions: In the analysis of the results, it is opportune to consider that in the post-implant evaluations the V100 is >85% in the 50% of cases and that if we exclude 6 cases, the mean value for D90 goes rapidly to 135 Gy. Among these last cases there are the first 3 patients (this could mean that it needs some experience in order to get better results as regards contouring), and other 2 patients for which the urologist detected light movements during implantation. Besides, in this study more than one reviewer contoured the prostate so interobserver variability could be a concern in the evaluation of the results. On the other hand, other authors report a remarkable discrepancy between the examined parameters before and after the implant [2,3].

We think that post-implant dosimetry and its analysis could be fundamental in order to improve the working methodology both during implantation and in the post-implant evaluation itself. Therefore we are confident that better results can be achieved in the near future.

References:

Radioactive sources of Iodine 125 – rapid strand

manipulation desk and seed in needle preparation  seed implantation
Rx-scopia at the end of implant

TC post implant dosimetry