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Purpose/Objective: Of all the possible radiotherapy modalities for localized prostate cancer, none offers such operator dependency as brachytherapy (BT). There are significant traps and risks that need to be mastered before a BT 'team' is skilled enough to perform the procedure. This competence occurs only after a BT 'team' has performed a certain number of procedures. In this work, the learning curve of our BT 'team' performing prostate high dose rate (HDR) BT with transrectal ultrasound (TRUS) guided real-time treatment planning was studied. To this aim, a new index called Optimal PlanIndex (OPI) was proposed. Moreover, dosimetric data about the first 60 treatments performed with this technique were analysed.
Materials and Methods: In December 2009 a new HDR BT facility was implemented for prostate treatments at INT. Since this date, 60 patients were selected according to GEC/ESTRO-EAU recommendations for temporary HDR prostate BT using an Ir-192 stepping source. TRUS-guided real-time treatment planning was adopted as the standard procedure instead of CT imaging. The major steps of this procedure are: i) a first ultrasound scan to perform treatment pre-planning. In this phase, needles location is decided; ii) patient implant; needles location might change from the one previously decided on the virtual pre-plan; iii) a second ultrasound scan is finally performed to guide the definitive treatment planning. All HDR treatments were then performed using a MicroSelectron-HDR(Nucletron) facility. The delivered dose per fraction was of 14Gy. All needles were immediately removed after treatment. To evaluate the learning curve of our BT 'team' to performing this procedure, a new index called Optimal Plan Index (OPI) was defined as the dose to 95% of the prostate divided by the dose to 0.1cc of the urethra.
Results: To evaluate the learning curve of the BT 'team', Dose Homogeneity Index (DHI), Conformity Index (COIN) as well as OPI were analysed. DHI and COIN didn't show any correlation with the BT 'team' increasing experience, whereas OPI resulted to be a good indicator of the learning curve. The lowest value of OPI was obtained on treatment number 12, where the pubic arc obstruction was erroneously estimated. The number of adopted needles with respect to the prostate volume was as well investigated to verify and possibly modify treatment planning strategies.
Conclusions: In contrary to the already existing DHI and COIN, the newly proposed OPI was a good indicator of the learning curve of our BT 'team' Analysis of the stored dosimetric data was useful to investigate and possibly modify treatment planning strategies (e.g., number of needles with respect to the prostate volume, optimization algorithm).

ELECTRONIC POSTER: BRACHYTHERAPY TRACK: PROSTATE CANCER

EP-1340
Re-implantation after insufficient primary 125-I permanent prostate brachytherapy
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Purpose/Objective: We describe five patients receiving a re-implantation (RI) after post-operative dosimetry of the primary 125-I permanent brachytherapy (BT) for prostate cancer revealed an insufficient dose coverage.
Materials and Methods: Out of 222 consecutive patients treated (from March, 2001 to August, 2012) with 125-I BT, dosimetric verification by CT and MRI fusion four to eight weeks after implantation displayed an insufficient dose coverage in five patients. In these patients, a RI with 10 to 19 seeds was performed three to four months after primary intervention. Dosimetry after RI showed an improved and sufficient total dose coverage in all patients.
Results: At last follow-up (18 to 99 months, median 57 months), none of the patients had relevant implant associated side-effects. Functional outcome was comparable to patients after one-time implantation. PSA levels post intervention showed a decreasing tendency in 4 patients. One patient had a local recurrence after 12 months. The D5% (Dose to 5% of the urethra volume) was aimed to be below 150% (217.5Gy) of the prescribed dose for primary implantation. During salvage re-implantation these criteria were not met in any of the 5 cases. The D5 values ranged from 221Gy to 376Gy. The volume of the rectum receiving 100% of the prescribed dose was aimed to stay under 0.3cm^3 (VR100%), this was exceeded in five re-implantations; the volumes ranged from 0.4cm^3 to 5 cm^3. Despite exceeding typical urethral and rectal dose constraints, toxicities were not observed.
Conclusions: In our series, approximately 2% of the patients treated with permanent prostate BT required and received a RI due to insufficient dose coverage. None of the patients who underwent RI experienced complications. Our series, along with other published reports, demonstrates good tolerability.

EP-1341
Real-time prostate brachytherapy treatment planning using transrectal ultrasound ñ the Oslo experience
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Purpose/Objective: High dose rate brachytherapy (HDRBT) has been established as an effective technique for dose escalation boost delivered in combination with external beam radiotherapy (EBRT). The placement of the needles is usually guided by transrectal ultrasound (TRUS). Modern ultrasound equipment and dedicated software enable real-time ultrasound based treatment planning. Such procedure has been used at Oslo University Hospital since 2007.
Materials and Methods: We have analysed 192 patients treated with HDRBT from January 2009 until October 2012 using Oncentra Prostate software. The HDRBT was delivered about four weeks prior to the EBRT using two fractions separated by two weeks. The CTV was defined as the prostate gland plus a 2 mm margin to account for possible extracapsular disease. The planning aim was to deliver 10 Gy to the CTV per fraction with a dose constraint of 12 Gy and 6.6 Gy to the urethra D0.1cc and the rectum D2cc, respectively.
Results: The prostate gland and the CTV had an average volume of 26.1 ± 8.7cc and 35.5 ± 10.7cc, respectively, and were treated using an average of 16 ± 2 needles. The D90 of the CTV was on average 10.5 ± 0.3 Gy, with 95% of the treatments resulting in a D90 of 10.0 Gy or higher. In average the urethra D0.1cc and the rectum D2cc was 11.4 ± 0.5Gy and 5.7 ± 0.7 Gy, respectively. For the whole treatment cohort an average conformity index (COIN) of 0.84 ± .04 was found. In average there was not found any significant change in the delineated prostate gland volume between the first and the second brachytherapy fraction, even for the group of patients where the same doctor performed delineation for both fractions thus eliminating interobserver variations. As expected, a positive correlation (R^2 of 0.42) was found between the prostate volume and the number of needles used. CTV volume and D90 was found to be uncorrelated. However, the analysis also showed a weak positive correlation between CTV volume and COIN, indicating that we were able to achieve higher conformity for larger prostate volumes.
Conclusions: Using real-time TRUS based HDRBT technique we were able to achieve a D90 at our planning aim for more than 95% of our patients without violating the OAR constraints.