autoradiograph. (c) The subtracted image clearly showing the physical position of the source in the applicator and path of the drive cable through the applicator lumen.

Conclusion: We have demonstrated a filmless approach to determining actual source positions corresponding to each dwell position in each channel of two gynaecological HDR brachytherapy applicators. Accuracy is generally sub-millimetre and can also be used to quantify the accuracy of using marker-wire defined positions for reconstructing applicators in planning. The flat panel detector method is efficient and provides additional information not possible with radiographic film.

Poster: Brachytherapy track: Prostate

PO-0974 Urethral and bladder dose of total and focal salvage brachytherapy: toxicity and dose constraints

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Purpose or Objective: Salvage Iodine-125 brachytherapy (I-125 BT) constitutes a curative treatment approach for patients with organ-confined recurrent prostate cancer after primary radiotherapy. Currently, focal salvage (FS) instead of whole-gland or total salvage (TS) is being investigated, to reduce severe toxicity associated with cumulative radiation dose. Differences in urethral and bladder dosimetry and constraints to reduce late (>90 days) genitourinary (GU) toxicity are presented here.

Material and Methods: Dosimetry on intraoperative ultrasound (US) of 20 FS and 28 TS patients was compared. The prostate, bladder, urethra (figure 1) and bulbomembranous (BM) urethra were delineated. Toxicity was assessed using the CTCAE version 4.0. Dose constraints to reduce toxicity in TS patients were evaluated with receiver operating characteristic (ROC) analysis.

Results: FS I-125 BT significantly reduces bladder and urethral dose compared to TS. Grade 3 GU toxicity occurred once in the FS group. For TS patients late severe grade 3GU toxicity was frequent (38% in the total 61 patients and 56% in the 27 analyzed patients). TS patients with high grade 3 GU toxicity showed higher bladder D2cc than TS patients without toxicity (median 43 Gy) (p = 0.02). The urethral V100 was significantly higher in TS patients with several toxicity profiles: grade 3 urethral strictures, grade 2 urinary retention and multiple grade 2 GU toxicity events. Dose to the BM urethra did not show a relation with stricture formation. ROC-analysis indicated a bladder D2cc <70 Gy to prevent grade 3 GU toxicity (AUC 0.76, 95%CI: 0.56-0.96, p = 0.02). A urethral V100 <0.40 cc (AUC from 0.73-0.91, p = 0.003-0.05) could prevent other late GU toxicity.

Conclusion: FS I-125 BT reduces urethral and bladder dose significantly compared to TS. With TS, there is an increased risk of cumulative dose and severe GU toxicity. Based on these findings, bladder D2cc should be below 70 Gy and urethral V100 below 0.40 cc.

PO-0975 External beam radiotherapy with HDR brachytherapy boost in prostate cancer: 5- and 8-year results

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Purpose or Objective: To report 5 and 8-year clinical outcomes, early and late complications in 226 patients with prostate cancer treated with high-dose-rate brachytherapy (HDR-BT) in combination with external-beam radiotherapy (EBRT).

Material and Methods: Between 2004 and 2010, 226 patients underwent HDR-BT in combination with EBRT as a treatment for their low, intermediate or high risk prostate cancer. The HDR-BT procedure was performed using ultrasound-based transperineal implantation. The total HDR-BT dose was 16 - 18 Gy in 2. The EBRT technique used by treatment was 3D-CRT (70.3%) or IGRT/IMRT (29.7%) with daily corrections of set up. Total dose of EBRT for low risk patients was 45 Gy in 25 fractions of 1.8 Gy within 5 weeks. For intermediate and high-risk patients the dose was 50.4 Gy in 28 of 1.8 Gy within 5 weeks. Patients were stratified by risk factors in to risk groups - 67 (29.5%) low, 87 (38.5%) intermediate and 72 (32.0%) high risk patients. Neoadjuvant hormonal therapy was applied in patient of intermediate or high risk of recurrence. High risk patients received adjuvant hormonal therapy.

Results: 5-year results after a mean follow-up of 70 months of the 226 patients the freedom from biochemical failure was 92.5%. 17 patients (7.5%) showed prostate specific antigen progression according to the Phoenix definition. In 9 patients clinical progression (bone or lymph node metastases) was documented. 8-year results after a mean follow up of 96 months of the 130 patients the freedom from biochemical failure was 82%. 23 patients (18.0%) showed prostate specific antigen progression. In 11 patients clinical progression was documented. Cancer specific survival during 5-year and 8-year follow up was 99.1% and 96.8% respectively. Toxicity was scored using the EORTC/ RTOG score system. During follow up we haven't observed any consequential toxicity or relationship between acute and late toxicity respectively. Higher incidence of GU and GIT toxicity was observed in patients treated by 3D-CRT technique. Acute and late gastrointestinal toxicity (GIT) was very low. Toxicity grade 2 was observed in 1.3% No grade 3 or 4 GIT toxicity was observed. Acute GU toxicity in most cases was grade 1 (40.2%) or grade 2 (10.6%). Late GU toxicity was also in most cases grade 1 (32.7%) or grade 2 (10.1%). Grade 3 toxicity was observed only in 2.2%. Grade 4 toxicity didn't occurred. We have detected a trend that higher grade late GU toxicity was observed after longer period of treatment than lower grade. Mean time of occurrence for grade 3 and 2 was 64 and 23 months respectively, compared to mean time 12 months for grade 1.

Conclusion: Combination of external beam radiotherapy with high-dose-rate interstitial brachytherapy boost is safety and effective option in treatment localized prostate cancer. Our results show a low incidence of acute and late complications with favorable oncologic outcome after 5 and 8 year follow up.