PO-0981
First experiences with combined EBRT and HDR-brachytherapy boost using Co-60 in patients with prostate cancer
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Purpose/Objective: To evaluate the first clinical and dosimetry data of a new afterloading machine using a Co-60 source.

Materials and Methods: Patients with prostate cancer were treated by combined external beam radiotherapy (EBRT) followed by a brachytherapy boost: After 46Gy EBRT to the prostate two fractions of 9 Gy were applied, each 2 weeks apart. In the new afterloading machine (Multisource®, Eckert & Ziegler BEBIG, Germany) it was installed using a Co-60 source. Toxicity data were compared to a cohort of 131 patients treated with Ir-192 and the same fractionation scheme at our institution from 2001 - 2008.

Results: A total of 117 patients were treated with Co-60 from 01/2008-10/2012. Median age at diagnosis was 72 years. Patients had a mean PSA value of 25.5 ng/ml and a mean Gleason-score of 7.2 (± 6: 16%, 7: 65%, 8: 19%). High risk tumours were present in 53%, intermediate risk in 42% and low risk in 5% of the patients. Neu-adjuvant androgen deprivation therapy was given in 38.2%. Mean prostate volume was 31.7ml and mean IPS was 7.4 at presentation. DVH parameters (mean values) for brachytherapy were D90: 8.97 Gy, COIN: 0.68. Dmax for rectal wall was 8.0 Gy and 11.8 Gy for the urethra. The TRAK value was 0.27 cGy x m². Toxicities were evaluated according to CTCAE v3.0. Most frequent acute GU toxicities were an increase in urinary frequency (49%, 19.6% and 5.9%, grade I / II / III), painful voiding (44%, 15% and 4%, grade I / II / III) and urinary bleeding after interstitial brachytherapy (36.5% and 11.5%, grade I / II). Acute GI toxicity presented with proctitis (12% and 6%, grade I and II) and diarrhea (14% grade I). No acute grade IV toxicity was reported. Late toxicities are not presented because of the short follow-up (median 13.7 months).

In comparison with the patients formerly treated with Ir-192 no significant increase in acute adverse events were reported (39.2% vs. 29.8% for grade II and 9.8% vs. 5.3% for grade III, Co-60 vs. Ir-192). The comparison of the dosimetry data is still under evaluation and will be presented at the meeting.

Conclusions: Using Co-60 for a HDR-brachytherapy boost after EBRT is a feasible technique in prostate cancer patients with no excess of toxicities in regard to Ir-192. Due to the short follow-up long term data on clinical outcome have to be awaited.

PO-0982
Additional value of T2-weighted MR imaging for post-planning dosimetry after I-125 prostate brachytherapy
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Purpose/Objective: The standard for the determination of post-implant dose parameters of trans rectal ultrasound-guided permanent radioactive I-125 implantation of the prostate (BT) is a CT-based identification of the implanted seeds and of the prostate and organs at risk. However, when BT depicts the seeds very clearly, the contour of the prostate cannot reliably be identified, due to poor soft tissue contrast. In this study, we evaluated added use of T2-weighted MR images (MRI) for prostate delineation, while the CT were used for seed identification.

Materials and Methods: Thirteen patients underwent both CT and MRI 30 days after BT. CT and MRI were manually registered based on seed localization using the registration tool in Eclipse V8.9. Registration was performed independently by 2 physicists. One physician contoured the prostate on CT and MRI on different days without seeing the other image modality. The evaluation was based on the minimum dose to 90 percent of the prostate (D90) and the percentage of the prostate receiving 100 percent of the prescribed dose (V100). The D90 and V100 were computed for CT-based (CT was used for seed localization and prostate delineation) and for CT/MRI based postplanning (CT was used for seed localization and MRI for prostate delineation). The variability of the dosimetric parameters based on registration uncertainty was estimated based on the variation of the D90 and V100 between the 2 physicists performing the registration.

Results: In contrast to other reports, we found a sufficient seed visibility on MRI for an effective registration based on seed localization. The major difficulty during registration was that the prostate shape varied in some cases and consequently not all seeds could be matched. This created an uncertainty for the registration, and depending on which seed group was chosen to match, the 2 physicists arrived at different registrations. Eliminating the 2 patients for which the registration was not possible, we found that the mean difference in the D90 and V100 between the CT-based and the CT/MRI-based post-planning was 4% and 9% (max deviation -18% and 30%) respectively. The mean difference in the D90 and V100 between the CT/MRI based post-planning by the 2 physicists (registration uncertainty) was 3% and 2% (max value 10% and 5%) respectively.

Conclusions: MRI is valuable in contouring more precisely the prostate and therefore getting a more realistic dosimetric characterization of the implantation. However, the registration adds an uncertainty to the postplanning process and this uncertainty must be understood to obtain meaningful data. Future investigations will evaluate the use of 3D MRI images to see if the uncertainty on the CT/MRI registration can be further reduced.

POSTER: BRACHYTHERAPY TRACK: SKIN CANCER

PO-0983
High dose rate hypofractionated in skin cancer using the Valencia applicator
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Purpose/Objective: The nonmelanoma skin cancers are among the most common tumours, especially in older patients. The classic approach is surgery, but the development experienced by high dose rate brachytherapy, achieves similar cure rates and cosmetic results. With this approach, at the Hospital La Fe, the Valencia Applicators are used as accessories of the Nucletron HDR microSelectron Unit, which allow treatment of lesions up to 4 mm deep and 3 cm in maximum diameter. The purpose of this work was to assess the oncologic and cosmetic results, and acute toxicity (RTOG/CTCv3), in patients with nonmelanoma skin carcinoma treated with Valencia Applicator with a new regime of hypofractionation.

Materials and Methods: We retrospectively reviewed the results of 48 basal cell carcinomas in 33 patients treated at our institution between January 2008 and March 2010, with a follow-up between 24 and 54 months (30% of the patients with a follow-up longer than 3 years). Most of the patients (55%) were male, and 70% were over 70 years. The treatment protocol includes the determination of the area (GTV - CTV) by a dermatologist with the dermatoscope and depth ultrasound. The treatment schedule consists of 7 Gy delivered in 6 by 7 Gy or 7 by 4 Gy fractions, scheduled in 2 sessions per week, reaching 42 Gy. The treatment is prescribed at 3 mm depth in those lesions whose depth is 3 mm or less, and at 4 mm for lesions between 3 mm and 4 mm.

Results: Of the 48 tumours treated, 35 were located in the facial and 13 elsewhere. Practically all the lesions (47/48) resulted in a depth lower than 3 mm. Local control at 3 months has been excellent (47/48) and registered a high dermal toxicity was grade 1 (RTOG/CTCv3), having been resolved with topical treatment at 4 weeks in all but one case that required 2 months. The esthetical result (RTOG/CTCAEv3) was magnificent in all cases.

Conclusions: In our experience, the HDR-BT with Valencia Applicator in hypofractionated regime provides excellent results, for both cosmetic and local control in the short term, with little toxicity. Moreover the hypofractionation facilitates compliance with treatment comfort in elderly patients.

POSTER: BRACHYTHERAPY TRACK: MISCELLANEOUS

PO-0984
Value of Doppler ultrasound analysis in the regression of uveal melanoma after episceral brachytherapy plaque
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Purpose/Objective: To evaluate the value of Doppler ultrasound analysis in the regression of uveal melanoma after episceral brachytherapy plaque.

Materials and Methods: We retrospectively reviewed the results of 48 nonmelanoma skin cancer cases treated at our institution between January 2008 and March 2010, with a follow-up between 24 and 54 months (30% of the patients with a follow-up longer than 3 years). Most of the patients (55%) were male, and 70% were over 70 years. The treatment protocol includes the determination of the area (GTV - CTV) by a dermatologist with the dermatoscope and depth ultrasound. The treatment schedule consists of 7 Gy delivered in 6 by 7 Gy or 7 by 4 Gy fractions, scheduled in 2 sessions per week, reaching 42 Gy. The treatment is prescribed at 3 mm depth in those lesions whose depth is 3 mm or less, and at 4 mm for lesions between 3 mm and 4 mm.

Results: Of the 48 tumours treated, 35 were located in the facial and 13 elsewhere. Practically all the lesions (47/48) resulted in a depth lower than 3 mm. Local control at 3 months has been excellent (47/48) and registered a high dermal toxicity was grade 1 (RTOG/CTCv3), having been resolved with topical treatment at 4 weeks in all but one case that required 2 months. The esthetical result (RTOG/CTCAEv3) was magnificent in all cases.

Conclusions: In our experience, the HDR-BT with Valencia Applicator in hypofractionated regime provides excellent results, for both cosmetic and local control in the short term, with little toxicity. Moreover the hypofractionation facilitates compliance with treatment comfort in elderly patients.
Purpose/Objective: To evaluate through Doppler ultrasound the intratumoral vascularization of uveal melanoma (UM) at diagnosis as a sign of tumoral activity, and to quantify its presence after treatment with brachytherapy.

Materials and Methods: 50 cases of UM were treated with brachytherapy from July 2005 to June 2010. 26 men and 24 women with an average age of 60. 70% melanotic, 18% amelanotic and 12% mixed. Location: 30% posterior, 16% postequatorial, 22% equatorial, 20% peripheral and 12% in ciliary body. Mean basal size and apical thickness at diagnosis were 12.1 ± 5.4 mm. A 125-Iodine plaque was used in 70% of cases and 106-Ruthenium in 28%. Transpupillary thermotherapy (TTT) was associated in 10 cases. The apical dose was 85 Gy. Mean follow up was of 29 months (13.7-69 months). Duplex Doppler scans (gray scale and Doppler scans) were done at diagnosis and every 6 months after treatment. Parameters evaluated: presence of intratumoral vessels, systolic peak velocity (SPV), end-diastolic velocity (EDV) and resistance index (RI= syst./diast./syst.).

Results: Doppler detected intratumoral vascularization at diagnosis in 21 of 50 cases (42%): vascularization persisted in 7 cases at 6, 12 and 18 months. At 24 months only persisted 5/31, at 30 months 3/20, at 36 months 1/12, at 42 months 1/6, at 48 months 1/3, at 54 months 1/2 and at 60 months 0/1. Mean systolic peak velocity at diagnosis was 25.2±16.1 cm/s and 15.8±10.5 at 6 months. The treatment had significant impact on the detection of tumour vessels (p=0.035), controlled by age, sex, maximum tumoral diameter and tumoral thickness in a logistic regression model. Mean resistance index was lower in tumours before treatment (0.50 vs 0.59, p=0.0047). Out of 6 tumours with persistent signal during follow-up, 4 were in regression, 1 large tumour reurred and was enucleated, and another large tumour developed in therapy optically. 8 avascular tumors at diagnosis were newly observed vascularization during follow-up: 1 recurring and was enucleated and the other 7 showed ophthalmoscopic and echographic regression, and vascularization eventually disappeared. 4 of them developed neovascular glaucoma (NVG). Reduction of the apical thickness at diagnosis was more significant in initial tumors that lost the Doppler signal than in tumors that remained avascular or vascular at 6 months (p=0.365). The SPV dropped significantly at 6 months (p=0.028) but EDV did not (p=0.116).

Conclusions: The non-invasive quantitative assessment of neovascular blood flow using pulsed Doppler for UM treated with brachytherapy offers a new diagnostic modality to evaluate the tumour activity. Most UM lose their Doppler signal in the first 6 months. Persistent intratumoral vascularization seems to relate to large tumours, recurrence or appearance of vascular congestion. The new vascularization cases can be explained by the persistence of old vessels, tumour recurrence or presence of NVG.

PO-0985
Chemoradiation with Brachytherapy for unresectable Klatskin tumours: Promising results from a prospective study

Purpose/Objective: To determine efficacy, toxicity, and patterns of recurrence in patients treated with endobiliary radiotherapy (RT) and external beam RT (EBRT) with chemotheraphy.

Materials and Methods: From Aug 2005 to July 2012, 65 patients with locally advanced or metastatic hilar cholangiocarcinoma were studied. All the patients presented with jaundice and required percutaneous biliary drainage. Endobiliary RT using HDR - Iridium 192 (median dose 14 Gy/4±2 b.i.d.,) was delivered through the PTBD catheter which was followed by metal stenting. Twenty two (34%) patients received only endobiliary RT, while 27 (41%) patients after brachytherapy were further treated with concur (median dose 45Gy/25#). Sixteen (25%) patients in who were referred after metal stenting, received Intensity modulated radiotherapy to a dose of 57Gy/25# with concurrent lnj. Gemcitabine (300mg/m2 weekly). Histopathological diagnosis was available in 50 patients (77%).

Results: Median follow up for whole group was 7 months (range 1-31 months). Two patients had complete responses, 17 (26%) patients had partial response and 12 patients had stable disease, while 11 patients had locally progressive disease after radiation. Twenty one patients were alive at last follow up. The median overall survival (OAS) was 7 months and one year OAS and Cancer specific survival (CSS) was 44% and 51% for whole group. Patients requiring endobiliary combined with chemoradiation or high dose chemoradiation alone had better survival as compared to patients receiving only endobiliary RT at 1 year (55% vs.17%, p=0.001). The main sites of distant disease progression were liver and peritoneum. Thirty one patients (48%) developed cholangitis of which 8 patients succumbed to it. Four patients had late radiation toxicities, of these 3 had hematological due to duodenitis and one had radiation induced stricture at gastroesophageal junction requiring dilatation.

Conclusions: These encouraging results suggest that endobiliary radiotherapy in addition to chemoradiation is feasible with acceptable toxicity in unresectable Klatskin tumors and leads to better outcome as compared to those receiving only endobiliary RT alone.

PO-0986
Surgical resection followed by HDR brachytherapy for management of keloids at high risk for recurrence

Purpose/Objective: Keloids are challenging lesions to treat with high rates of recurrence. There are a multitude of treatment options available with varying rates of success. Evidence has shown surgical resection followed by RT to have the highest level of local control and numerous reports have shown control rates of 65 - 90% with adjuvant external beam RT. Prior studies have demonstrated a spectrum of aggressiveness for keloids. Secondary keloids or lesions that have undergone prior resection and then recur are often refractory to further treatment with higher rates of recurrence. Keloids that recur after combined surgery and EBRT are especially difficult cases and lack guidelines. The objective of our study was to determine the efficacy of surgical resection of keloids followed by HDR brachytherapy for management of lesions at high risk for recurrence.

Materials and Methods: This study is a retrospective analysis of 18 patients representing 29 keloids found on various body sites including the chest wall, axilla, breast, ear, pelvis, chin, cheek, neck, back, shoulder, and abdomen, treated at Montefiore Medical Center between 1996 and 2011. Our study population consisted of mainly secondary lesions already treated in the past with the combination of surgery and EBRT, lesions treated with surgery alone, or primary keloids deemed to be at a high risk for recurrence due to their size and location. The treatment in this study consisted of complete surgical excision with placement of hollow brachytherapy catheters, immediately followed by HDR Iridium-192 brachytherapy to a total dose of 15Gy in 3 fractions, over 3 consecutive days, prescribed to a 1cm depth. Endpoints assessed included recurrence rate, treatment complications, and side effects. 14 lesions had undergone prior resection(s) and external radiation, 6 had a previous surgery alone, and 9 were primary lesions. The two most common sites were earlobe and chest wall. The mean age at treatment was 43 (range 23-64 years).

Results: The mean follow up in our study was 62 months (range 12-192 months). Analysis of the data demonstrated a recurrence-free rate of 89.6% (26/29 lesions). Two of the recurrences had received previous surgery and EBRT and one was a primary keloid with no prior treatment. 7 patients experienced delayed wound healing but eventually had a full recovery. 3 patients had post-operative infections at the surgical site that were successfully treated. Two patients experienced mild intermittent parasthesias at the treatment site and one complained of mild pruritis post-treatment. For the other 26 lesions, there was an improvement in keloid symptoms including pain, parasthesias, and pruritis.

Conclusions: Surgical resection and adjuvant HDR Iridium-192 brachytherapy provide excellent and enduring levels of local control for keloid lesions at high risk for recurrence and with acceptably minimal long term side effects with a mean follow up of 62 months.

PO-0987
MRI-Adaptive image guided brachytherapy (AIBT) in anal canal: a feasibility study

Purpose/Objective: The aim of this study was to evaluate the feasibility, safety and the early clinical results of a new procedure of