kV images. Mean displacements on all the three axes were between 1mm and 79% of differences in cranio-caudal direction, 82% in lateral direction and 81% in ventro-dorsal direction between <1mm and 1mm. ANOVA test shows significant differences between the mean displacements of the samples (p < 0.05). In AP, CC and ML directions, systematic discrepancies were 0.33, 0.32, and 0.42 mm and random discrepancies were 1.25, 1.42, 1.21 mm, respectively. Mean radial discrepancy was 1.78 mm (range 1.11-2.88 mm). By van Herk’s formula CTV-PTV margins needed to account for such inter-observer variability were 1.70, 1.80 and 1.90 mm in AP, CC and ML directions, respectively.

Conclusion: The study showed a small inter-observer variability between the RO and RTT’s observations after an adequate training, which allows a partial delegation of daily kV control, if the displacements were not superior to PTV margins.

Poster: RTT track: Elderly and radiation therapy

PO-1011
Radiotherapy of brain metastases. Relationship with patients age an Karnofsky Index
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Purpose or Objective: Brain metastases are common secondary lesions in several types of neoplasms. Survival is poor, so the treatment with external radiotherapy has as main goal to improve the quality of life of patients by decreasing the possible symptoms that may have.

Our objective is to analyze age and general condition of the patients and their possible influence on the response to treatment with radiation therapy in terms of survival.

Material and Methods: We evaluated 84 patients with brain metastases treated with external radiotherapy. Karnofsky Performance Status (KPS), was the tool to evaluate functional status the first day of treatment. We divided the population in two KPS groups: <70 vs ≥ 70

We also distinguish two age groups: <70 years vs ≥ 70 years. Survival is expected.

Results: Global mean survival: 5.2 months; median: 3 m
Survival <6months: 27patients (32,1%)
6-12 m: 11pts (13%)
>12 m: 9pts (10,7%)

Karnofsky Performance Status(KPS):
<70: 28 patients (33,3%) mean survival: 5,4 m; median: 3 m
>6m: 23 (82,1%)
6-12m: 4 (14,3%)
>12m: 1 (3,5%)

≥ 70: 56 pts (66,6%); mean survival: 5,4m; median: 3 m
<6m: 34 (60,7%)
6-12m: 14 (25%)<12m: 8 (14,3%)

Age:
<70years: 58 patients (69%) mean survival: 5.1 m; median: 3 m
<6m: 41 (70,7%)
6-12m: 10 (17,2%)
>12m: 7 (12%)
≥ 70y: 26 (31%) mean survival: 5,3m; median: 3 m
<6m: 16 (61,5%)
6-12m: 8 (30,7%)
>12m: 2 (7,7%)

Conclusion: There are no significant differences in survival (months) depending on the age or the KPS in the analyzed population.

Survival in patients with KPS <70 is poor and less than six months in most cases. Most patients under 70 years have a survival <6mSurvival >12m is higher in KPS >70.

Survival in elderly patients (≥ 70years) is also less than six months. 6-12 months survival is higher in the elderly patients compared to the younger group, although survival >12m is slightly higher in the group of younger patients (<70y)

With these results we can consider applying hypofractionated treatment schemes (developed in few sessions) in the group of patients with KPS <70 or age >70 years, where poor survival is expected.

Poster: RTT track: Adaptive treatments in the pelvic region

PO-1012
Can we adequately irradiate bladder cancer without daily on line adaptive treatment?
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Purpose or Objective: Standard pattern of care for muscle-invasive T2-T3 bladder cancer is surgery. However, some patients are not eligible for surgery because of age, comorbidity or non-resectability of the tumour. These patients are treated with radiation therapy. In the literature a large internal motion of the bladder has been reported. Therefore a portion of the Clinical Target Volume (CTV) can be missed during daily treatments. Our current treatment margins have been adjusted according to the findings of these studies. Reduction of margins is important for sparing the bowel. In the present study we investigated the influence of the bladder size and shape as well as the location of tumour itself on the margins.

Material and Methods: From 2013 to 2015, ten patients with solitary bladder cancer were treated. In five patients the tumour was marked circumferentially around the tumour bed using intravesical lipiodol injection. In the other five patients the tumour was not visible anymore after resection of the tumour and no lipiodol was used. As part of our routine treatment protocol, patients were instructed to have a full bladder during simulation and irradiation. They received instructions to void one hour prior to CT simulation or treatment and drink 250 cm3 of liquid. We acquired ConeBeam CT (CBCT) scans daily in the first week of the treatment and thereafter weekly. The bladder and lipiodol volumes were delineated on the CBCT. A bouding box and the centre of mass (COM) was calculated for the bladder and the tumour volumes on both the reference CT and all CBCT’s for further analysis. Finally, a comparison of margins was carried out.

Results: In ten patients 93 CBCT-scans were analysed. Despite the full bladder protocol individual deviations were found in the bladder volume, mean volume 203 (SD 93ml), figure. Of the six anatomical directions the movement in the cranial and anterior direction were the largest and appeared to correlate with the volume of the bladder.
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Figure: Boxplot of the bladder volumes for each patient. Need daily on-line adaptive treatment to adequately treat a considerable reduction in margin is achieved. Therefore, we account in preparing the treatment plans of the day, a calculated margin based on the difference between the actual position of the lipiodol, and subsequently we developed a model to predict the position of the lipiodol in the bladder. Based on this correlation we lipiodol depended on the bladder volume and the location of the lipiodol in the bladder. In the five lipiodol patients we found that the COM of the lipiodol movement compensation. This work analyzes the potential concepts for Individualized Radiotherapy (iRT). Adaptive radiotherapy in prostate cancer patients: Combs1,2, K. Kessel1,2

Purpose or Objective: To evaluate interfraction volume variations and dose variations of organs at risk (OAR) and to develop individualized radiotherapy (iRT) concepts with movement compensation. This work analyzes the potential benefit of adaptive planning in patients with prostate carcinoma.

Material and Methods: We analyzed 16 patients with prostate cancer treated with helical IMRT and daily image guidance. Eight patients received radiation after prostatectomy with a total dose of 68 Gy in 34 fractions (group A), and eight a definitive irradiation with a total dose of 76.5 Gy in 34 fractions (group B). OAR rectum and bladder were delineated on daily Megavoltage (MV)CTs With the Planned Adaptive software by Tomotherapy® (Accuray Inc., Sunnyvale, CA) we performed dose recalculations on the single fractions CTs and compared the summation dose with the original planned dose. Dose variations were analyzed by means of Dmedian, Dmean, Dmax, Dmin, V30, V40, V60, V70, V75, as well as the OAR volume.

Results: Our evaluation is still ongoing. During treatment, rectum volume ranged from 62-223% (A: 62-157%, B: 63-223%) of its initial volume; bladder from 22-375% (A: 30-311%, B: 22-375%). The mean of the Dmean in the rectum was 30.7 Gy and 37.2 Gy in group A and B, respectively; and for the bladder 26.4 Gy and 40.8 Gy. The dose statistics for the rectum was as follows: V30 22.2- 90.2%, V40 14.2 -80.5%, V60 3.8 -89.8%, and 37.2 Gy in group A and B, respectively; and for the bladder 26.4 Gy and 40.8 Gy. The dose statistics for the bladder were: V30 15.6-100.0%, V40 10.9- 100.0%, V60 3.8-89.8%, and 75 0.5-19.4%.

Conclusion: For patients with prostate cancer, relevant variations in volume of OAR, such as rectum and bladder, can be observed. Hence, corresponding dose variations occur. Adaptive replanning approaches have the potential to reduce the dose to OAR. However, which concept, e.g. “plan of the day” or fast online recalculation, will be the suitable solution for routine patient treatment needs to be assessed in further evaluations.

PO-1014

Long time follow-up experience after IMRT for anal cancer: clinical outcomes and late toxicities

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Purpose or Objective: To assess outcomes of patients with anal canal treated with Intensity-Modulated Radiation Therapy (IMRT) after a long time follow-up.

Material and Methods: From July 2007 to September 2015, 233 patients were treated by IMRT for anal squamous cell carcinoma. In 2009, Volumetric Modulated Arc Therapy RapidArc (VMAT RA) rapidly became our usual way of radiation for this cancer. Radiotherapy consisted in delivering 45 Gy in 1.8 Gy daily-fractions, 5 days a week, to the primary tumor and the risk area including pelvic and inguinal nodes (PTV1). A second plan of 14.4-20 Gy was administered to the primary tumor (PTV2) in 1.8-2 Gy daily-fractions, also 5 days a week (image 1), or by pulsed-dose rate interstitial brachytherapy for some T1 and T2. PTV1 and PTV2 were treated continuously without gap and without Simultaneously Integrated Boost (SIB). Concurrent chemotheraphy based on 5FU-mitomycin (MMC) or cisplatin was added for locally advanced tumors. Toxicities were evaluated according to the Common Toxicity Criteria for Adverse Events 4.0 scale. The survival estimates and their associated CI95% were calculated using the Kaplan-Meier method. We present here the first 166 patients’ outcomes.

Results: Median follow-up was 46.7 months CI95% [41.2, 51.6]. 124 women (75%) and 42 men (25%) were analysed. Median age was 61 years (range, 36-92). Tumors were classified as stages I, II, III and IV in 13%, 25%, 57% and 4% of the cohort, respectively. 13 patients were immunocompromised, 10 of those were HIV-positive (6%). Radiochemotherapy (RCT) or radiotherapy alone (RT) was delivered in 132 (80%) and 34 (20%) patients, respectively: 104 (79%) MMC, 25 (19%) cisplatin and 3 (2%) other regimens. 21 patients (13%) had the PTV2 treated by brachytherapy. 162 patients (97.6%) were complete responders. 36 patients (21.7%) had a relapse: 20 local (56%) among which were 3 synchronous metastatic failures, 4 locoregional (11%) and 12 metastatic without any local failure (33%). 33 patients (20%) had a colostomy following radiotherapy : 17 (46%) for local relapse, 12 (32%) for radiation toxicity, 3 (8%) for an incomplete response, 1 (2.7%) for tumor complications during RCT. Concerning late toxicities: no grade 4 was observed; grade 3 were diarrhea (1 patient), proctitis (11), vaginal stricture (5), hematuria (1), fecal incontinence (4), chronic radiodermatitis (2 patients); 28 cases of grade 2 occurred among those clinical categories. About the hematologic late toxicity, there wasn’t any significative difference between the blood count prior to treatment and the recent one (p=0.23). The 3-year overall survival rate was 85.5% CI95% [78.7-90.3], cancer-specific survival 89.0% CI95% [82.5-93.1], disease-free survival 74.6% CI95% [67.8-80.8].