Purpose/Objective: Patient 1: Prostate cancer diagnosis at the age of 71 years in March 2004, T4N0M2, Gleason 4+5, PSA 14. MRI confirmed involvement of vesicles, rectum and bladder. Local EBRT with photons in daily 2 Gy fractions to 70 Gy and 6 months of neo-adjuvant GNRH analogue was supplied. Follow-up for 3 years, PSA <0.4 mg/L. In April 2007 the patient had difficulties in interpretation of reading. CT, MRI, whole-body acetate-PET, methionin-PET and biopsy showed a solitary 3.5 cm metastasis in the left temporal lobe as the only sign of disease recurrence. Rapid complete clinical response on steroids was declared by the patient. Local proton boost of 12 daily fractions of 2.4 Gy (RBE 1.1), followed by proton EBRT to the whole brain of 15 daily fractions of 2 Gy, in total 61.1 Gy EDQ2 (a/b 3 Gy) was given to the metastatic lesion. Restart with GNRH analogue for 2 years followed by bicalutamide so far. During the follow-up for another 5 years repeated PET assessments reveal a very slow resolution of the lesion. The patient is still healthy without any signs of prostate cancer, only complaining about less memory capacity.

Patient 2. Prostate cancer diagnosis at the age of 53 years in May 2005, T4N0M0, Gleason 4+4, PSA 158 mg/L. MRI plus spectroscopy and acetate-PET confirmed involvement of the left vesicle. GNRH analogue and bicalutamide was supplied for 6 months before radiotherapy (RT) and then adjuvant for 5 years. The RT applied was local perineal proton boost involving a major part of the vesicles of 4 daily fractions of 5 Gy followed by IMRT to prostate and pelvic nodes of 25 daily fractions of 2 Gy, with dose painting up to 2.2 Gy to a volume of persistent SUV uptake within prostate assessment just before start of RT. In total 87 Gy, EDQ2 (RBE 1.1, a/b 3 Gy) to the prostate and 94 Gy EDQ2 to the intraprostatic boost volume was supplied. During the follow-up of more than 7 years repeated acetate-PET assessments reveal a notably slow decline in SUV uptake. The patient is still healthy without any signs of prostate cancer or GU and GI toxicity.

Materials and Methods: See above.

Results: See above.

Conclusions: Utilizing the best available imaging in staging of very high risk prostate cancer allows selection of patients for highly advanced delivery of radiotherapy and improvement of the prognosis. The slow decline in SUV reveals persistent metabolic activity, which suggests that the radiotherapy response is permanent growth arrest rather than mitotic cell kill.

EP-1077

Comparison of local treatments for localized prostate cancer: radiotherapies are superior to HIFU ablation

S. Knyazev, S. Knyazev

Purpose/Objective: Comparison of local treatments for localized prostate cancer: radiotherapies are superior to HIFU ablation

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Fig. 1 Time to biochemical failure (TBF) after local treatments in Samara Regional Oncological Center from October 2007 to January 2012

Survival analysis was performed using Kaplan Meier curves and log rank method. Cox regression was applied to investigate risk factors.

Results: Of 181 selected patients, 66 received EBRT, 61 - BTI125, while remaining 54 patients were treated with HIFU. Median follow-up, initial age, prostate volume, proportion of stage 1 and PSA level were 24, 56, 41 months; 71, 68, 69 years, 37, 32, 36 ml; 43%, 20%, 28% (p=0.017) and 10, 12, 12 ng/ml for EBRT, BTI125, and HIFU group respectively. Biochemical progression occurred to 25% patients after HIFU therapy, while in the EBRT group - to 11% (p<0.0001) and in BTI125 - to 16% (p=0.001). Median time to biochemical relapse were 61.0 (95% confidence interval (CI), 55.0-67.3), 67.3 and 34.7 months, p=0.0001 for EBRT, BTI125, and HIFU, respectively. In Cox proportional hazards model after adjustment for stage, Gleason score and initial PSA, EBRT (OR 0.20, CI 95%, 0.09-0.42, p<0.0001) and BTI125 (OR 0.31, 95% CI, 0.13-0.74, p<0.0001) remained superior to HIFU by means of biochemical failure.

Conclusions: Both external beam and interstitial radiation therapy exhibit better efficacy as compared to HIFU therapy in the treatment of localized Stage 1-2 prostate carcinoma.

EP-1078

Auto-delineation tools in prostate radiotherapy: a valid investment for the future?

S. Prewett, M. Mukesh, R. Jena, R. Benson, R. Huddart

Purpose/Objective: The accurate delineation of both clinical target volumes (CTVs) and organs at risk (OARs) is crucial in modern prostate radiotherapy. However, this process is time consuming and subjected to considerable inter-clinician variation. Auto-contouring software could be one way of reducing outlining times and/or reducing inter-clinician variation. MIM is a commercially available atlas-based auto-contouring software package and the aims of this study are to determine whether MIM can reduce intra-clinician variability and delineation times for prostate cancer.

Materials and Methods: Five cases of locally advanced prostate cancer were randomly selected and seven clinicians were asked to delineate CTVs and OARs using a set of delineation guidelines. Total time required for delineation was recorded using a stop watch. A MIM atlas of 50 patients was prepared and stratified according to bladder volumes. The MIM software (version 5.1) was then used to auto-contour the 5 original cases and clinicians were asked to edit the auto-contoured structures and record delineation/registration times. The intra-clinician variation was assessed using conformity level (CL). The CL and delineation times were compared with and without MIM using a paired t-test.

Results: The CL pre-MIM of CTV1 varied from 0.40-0.60 (mean 0.52) and CTV2 between 0.50-0.61 (mean 0.52). There was no significant improvement in CL using MIM software for CTV1 (mean 0.54, p=0.44) and CTV2 (mean 0.56, p>0.22). Mean bladder CL improved from 0.68 to 0.74 (p=0.04) with no improvement for other OARs. The delineation times were not significantly shorter using MIM software except the right hip (table 1), but varied between clinicians (figure 1).

Table 1: Structure Delineation time pre-MIM (mean) Delineation time post-MIM (mean) p value (using paired t-test) and 95% CI

<table>
<thead>
<tr>
<th>Structure</th>
<th>Time (min)</th>
<th>Time (min)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTV1</td>
<td>5 min 13 sec</td>
<td>4 min 26 sec</td>
<td>0.207 (-39.73-133.59)</td>
</tr>
<tr>
<td>CTV2</td>
<td>1 min 48 sec</td>
<td>3 min 22 sec</td>
<td>0.0786 (-258.71-24.76)</td>
</tr>
<tr>
<td>Bladder</td>
<td>2 min 32 sec</td>
<td>2 min 28 sec</td>
<td>0.800 (-0.10 to -0.006)</td>
</tr>
<tr>
<td>Rectum</td>
<td>2 min 58 sec</td>
<td>3 min 22 sec</td>
<td>0.424 (-0.082 to 0.042)</td>
</tr>
<tr>
<td>Right hip</td>
<td>1 min 42 sec</td>
<td>1 min 04 sec</td>
<td>0.005 (26.7-96.1)</td>
</tr>
</tbody>
</table>
Conclusions: Use of Mim software failed to improve the conformity level and showed no significant time-saving in this study. Further research and demonstrable benefits are required before it can be incorporated into routine practice for prostate cancer outlining.

EP-1079 Image-guided radiotherapy in prostate cancer: preliminary experience with kV CBCT
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Purpose/Objective: Accurate and reproducible patient (pts) positioning during radiotherapy is necessary for precise dose delivery. The aim of the study was to evaluate target positioning accuracy during prostate cancer (PC) treatment using cone beam CT (CBCT) image-guided localization system (XVI, Elekta) during a few fractions (fr) of radiotherapy.

Materials and Methods: 22 pts with PC were treated in supine position on linear accelerator (Elekta Synergy) equipped with XVI (v.4.2). CBCT was performed according to our protocol on 1,2,3,4,11, 21 and 29 day of treatment. The results of matching the reference planning CT scans with CBCT datasets were represented as translations and rotations in 3 directions: lateral (X), longitudinal (Y) and vertical (Z). However, the table on accelerator allowed correcting translations only.

Results: The translations variations (cm) for the first three fractions were: on 1st fr: -0.06±0.25; 0.19±0.44; -0.11±0.33 in X, Y, Z direction, respectively. On the 2nd fr: -0.01±0.27; 0.16±0.47; -0.23±0.33 and on the 3rd fr: -0.09±0.34; 0.14±0.38; -0.19±0.32 along X, Y, and Z directions, respectively. The 3D vector was 0.53±0.36; 0.59±0.34; 0.60±0.24 for the 1,2,3 fr respectively. On the 4 fr, after the calculation the mean of translations from the 1,2,3 fr, the X, Y, Z shifts were as follows: 0.9±0.29; 0.1±0.3; -0.09±0.24 with the vector length of 0.44±0.2. During the succeeding fr the following shifts in X, Y, Z direction were evaluated: on the 11th fr 0.05±0.33; 0.00±0.3; 0.04±0.27; on the 21st fr 0.02±0.29; 0.09±0.37; 0.03±0.17 and on the 29th fr -0.13±0.41; 0.07±0.29; 0.10±0.27. The magnitude of 3D vector was 0.45±0.23; 0.45±0.22; 0.50±0.21 for the 11,21,29 fr, respectively.

Conclusions: Our protocol seems to be a useful tool for overloaded radiotherapy departments, where performing every day CT-based IGRT is impossible. The greatest discrepancy between target position on reference planning CT and pretreatment CBCT on the accelerator was observed during the first fractions and decreased in the succeeding fr. The CBCT is a useful tool in determining and improving the accuracy of radiotherapy in PC.

EP-1080 Feasibility and prognostic factors for toxicity in prostate cancer patients treated with helical tomotherapy
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Purpose/Objective: New technologies such as intensity modulated and image guided radiation therapy have been shown to decrease acute toxicity for prostate cancer (PC). We present the clinical results and the assessment of prognostic factors of radiation therapy with helical tomotherapy (HT) for clinically localized and recurrent PC, as well as post-prostatectomy adjuvant treatment.

Materials and Methods: From May 2006 to January 2011, 70 cT1-T3 cNO cM0 PC patients were treated with HT (primary diagnosis, n=48; post-prostatectomy biochemical recurrence, n=15; post-brachytherapy biochemical recurrence, n=2; and post-prostatectomy adjuvance, n=5). The dose prescribed to the prostate ranged between 72-78 Gy, except for one case (post-brachytherapy recurrence, 66 Gy) with conventional fractionation (2 Gy/fraction). The seminal vesicles received between 50-56 Gy, the surgical bed 66-74 Gy, and the pelvic lymph nodes 46-50 Gy (n=20), respectively when applicable, with conventional fractionation. Genitourinary (GU) and gastrointestinal (GI) toxicity was scored using the Radiation Therapy Oncology Group (RTOG) scoring system. Potential risk factors for toxicity were assessed in univariate and multivariate logistic regression analysis.

Results: The median age was 68 years (range 51-87 years). The median follow-up was 37 months (range 3-74 months). The mean initial Gleason score was 6 and the mean initial PSA was 17 ng/ml. For patients with a primary diagnosis or those receiving adjuvant HT, median overall survival was 45 months (range, 8-82 months). For patients receiving HT for biochemical recurrence, overall survival was 24 months (range, 3-73 months). Overall, 20 of 22 patients died, and none of them due to a cancer-related cause. Local recurrence was seen in 1 patient which had been treated for a biochemical recurrence after initial prostatectomy. Regional recurrence and bone disease only occurred in one patient with primary intermediate risk PC. The rates of acute grade 2 gastrointestinal (GI) and genitourinary (GU) toxicities were 13% and 10%, respectively. Only one patient experienced acute grade 3 GU toxicity. The rates of late grade 2 GI toxicities were 1.5%, and those of late grade 2 GI toxicities were 1.2%. No patients experienced late grade 3 toxicity. Multivariate analysis showed that receiving a rectum mean dose >median (39 Gy) or a bladder median dose >median (46 Gy) was associated with a higher grade of acute GI (OR: 3.53; P=0.017) and GU toxicity, respectively (OR: 5.31; P=0.019). In addition, having an older age was associated with a higher grade of late GU toxicity (OR: 3.94; P=0.026).

Conclusions: This preliminary report confirms the feasibility of HT for prostate cancer. HT is associated with a very low risk of toxicity and a low recurrence rate. Acute and late gastrointestinal and genitourinary toxicities were tolerable without any grade > 3 side effects.

EP-1081 Low rate of lymphedema after pelvic lymphadenectomy followed by pelvic irradiation of node positive prostate cancer
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Purpose/Objective: The aim of the present study was to evaluate the prevalence and severity of lower limb lymphedema after pelvic lymphadenectomy and radiotherapy to the pelvic lymph nodes in patients with prostate cancer.

Materials and Methods: Twenty-six patients underwent combined treatment for high-risk node positive prostate cancer at the department of oncology at Skåne University Hospital between April 2008 and March 2011. The treatment consisted of pelvic lymphadenectomy followed by androgen deprivation therapy and radiotherapy to the pelvic lymph nodes and prostate. The pelvic nodes, prostate and seminal vesicles were treated with external beam radiotherapy (EBRT) to an absorbed dose of 50 Gy followed by a brachytherapy boost of 2*10 Gy to the prostate only. Twenty-two patients accepted an invitation to a clinical examination with focus on lower limb swelling. The time between RT and examination was median 2.4 years (range 1.2-4.1 y).

Results: Six patients (27%) experienced grade 1 lymphedema and two patients (9%) grade 2 while none had grade 3 or 4 according to the CTC Common Toxicity Criteria scale 4.0. Three patients required compression socks.

Conclusions: Brachytherapy and pelvic EBRT have a low incidence of lymphedema in patients with high risk node positive prostate cancer that have undergone pelvic lymph node dissection. The follow-up time is however short and patients need to be followed for a longer period of time.