Conclusions: Fecal symptoms and intestinal QOL deteriorated during CRT for prostate cancer while global QOL was not affected. Although a number of ano-rectal symptoms improved after radiotherapy, fecal bother and EORTC PR25-bowel symptoms continued to be inferior to pretreatment values throughout follow-up. Reducing ano-rectal symptoms in CRT for prostate cancer might have a positive impact on QOL.

4050 POSTER

Proton radiotherapy for patients with prostate cancer – in the Hyogo Ion Beam Medical Center (HIBMC) experience

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Background: Proton radiotherapy (PRT) is sophisticated treatment modality for prostate cancer that is increasing in Japan. The purpose of this study is to examine clinical results of prostate cancer treated with PRT.
Materials and Methods: From Apr 2003 to Oct 2004, 291 males aged 48−85 (average 69) with histologically-proven cT1−3N0M0 prostate cancer (1997 UICC TNM) received PRT at the HIBMC. Clinical T stage was classified T1a/T1b/T1c/T2a/T2b/T3a/T3b as 2/3/112/80/38/36/20. Initial prostate specific antigen (PSA) level was distributed 1.2 to 222 (mean 17.8 ng/ml). Patients were stratified into three prognostic risk groups: Group A patients had a T1-T2a, PSA < 20 ng/ml, and the percentage of positive prostate biopsies (PPPB) <50%; Group B: T2b-T3, or 20 ng/ml < PSA < 50 ng/ml, or PPPB < 50%; and Group C: PSA > 50 ng/ml irrespective of T factor. 83 of 170 patients in group A received PRT with neoadjuvant androgen ablation (NAA) for 6 months. 101 of 102 in group B were treated by NAA followed by PRT. All of 19 in group C were treated by NAA, PRT and adjuvant androgen ablation. PRT was planned with a 3D planning system using bilateral 2 fields; patients received 74 GyE (gray equivalent, using a relative biologic equivalence factor of 1.1) of protons (190 to 230 MeV) at 2.0 GyE per fraction. GI and GU toxicity was scored according to the RTOG/EORTC Late Morbidity Grading Scale. Overall survival (OS) and biochemical disease free survival rate (Houston definitions: absolute nadir plus 2 ng/ml dated at the call) were calculated by Kaplan-Meier estimates.
Results: Five patients died from other disease in the follow-up period ranging from 28 to 47 months (median 36 months). Biochemical disease free survival rates/OS rates at 3 years was 92%/98% in all cases and was 98%/99%, 90%/97%, 57%/100%, in the group A, B, C, respectively. According to MSKCC risk criteria, three year biochemical disease free survival rates in favorable (n = 62) /intermediate (n = 106) /unfavorable (n = 117) were 100%/98%/83%, respectively. The GI/GU toxicity rates of grade 2 and grade 3 were 4.1%/4.1% and 0%/0%, respectively.
Conclusions: Our proton radiotherapy showed excellent OS and biochemical disease free survival rates in patients with prostate cancer with minimum late morbidities.

4051 POSTER

Long-term effect of radiotherapy of the healthy prostate on Serum-PSA levels

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Background: Prostate-Specific antigen (PSA) is a 34 kilodalton protease exclusively secreted by the epithelium of the prostatic ducts to lyse seminal vesicular protein. Its concentration in the seminal fluid is about 100x higher than in the blood. PSA concentration in serum (s-PSA) is a common indicator for diagnosis, treatment monitoring, and relapse in prostate cancer. Irradiation of the healthy prostate may impair its exocrine function and consequently impact on serum PSA level. On the other hand, prostate cancer regression due to irradiation also affects s-PSA. PSA kinetics after radiotherapy for prostate cancer is a combined result of both. Surprisingly, scarce data exists on radiation induced s-PSA changes in the absence of prostate cancer. Here we present long-term follow-up data of a previously published study (1) on the effect of pelvic irradiation on s-PSA levels.
Materials and Methods: We examined s-PSA in 33 men (median age 62.9 y) who had undergone pelvic irradiation for rectal and anal cancer. These men had no prostatic diseases. The prostate has been inadvertently irradiated in all patients as confirmed by CT-based treatment plans. 26 patients received conventional radiotherapy with 50.4 Gy/1.8 Gy, and seven patients 25 Gy (5 × 5 Gy fractions). Total (free and bound) s-PSA was measured with an immunoassay using monoclonal anti-PSA antibodies (Elecsys PSA assay, Roche; Diagnostics, Mannheim). Blood samples were drawn before, during, and after radiotherapy in regular intervals. In the meantime 9 patients deceased and 14 patients were lost to follow up. In 10 patients long term data were available with a median follow-up of 7.9 (7.2−8.5) years from study entry.
Results: Serum-PSA levels increase steadily within the first weeks of irradiation, peaking at 2−3 weeks with a lg(PSA) excess of 0.37 ($p < 0.01$), i.e. a 2.3 fold increase. At the end of radiation therapy, PSA levels decrease, but are still slightly elevated. On the long term, serum PSA decrease below the initial level, but this decrease is not significant [lg(PSA) = 0.19, $p = 0.26$].
Conclusions: Irradiation of the healthy prostate causes a significant transient increase of serum PSA levels. In comparison to the elapsed time the accumulated dose is of minor importance. On the long term 7−8 years after radiotherapy s-PSA decreased gradually, but this trend was not significant. This decrease may indicate a radiation-induced glandular insufficiency.

References

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4052 POSTER

MRI-based preplanning in low-dose-rate prostate brachytherapy

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Background: TRUS-based preplanning is inconvenient and uncomfortable due to the insertion of a probe into the rectum and a catheter into the urethra. If similar results as accurate as those obtained through TRUS-based preplanning could be obtained by MRI-based preplanning, then it would be comfortable and convenient for patients. To compare the dosimetric results between MRI-based and TRUS-based preplanning in permanent prostate brachytherapy, and to estimate the accuracy of MRI-based preplanning by comparing with CT/MRI fusion-based postimplant dosimetry.
Methods & Materials: Twenty-one patients were entered in this prospective study with written informed consent. MRI-based and TRUS-based preplanning was performed. The seed and needle locations were identical according to MRI-based and TRUS-based preplanning. MRI-based and TRUS-based preplanning was compared using DVH-related parameters. This analysis included a comparison of the prostate volume, prostate V100(%), prostate D90(%), urethral D30(%), urethral D5(%), urethral V150(cc), rectal V150(cc), and rectal V100(cc). Following brachytherapy, the accuracy of the MRI-based preplanning was evaluated by comparing it with CT/MRI fusion-based postimplant dosimetry. The group comparisons for the volumes and dosimetric parameters were performed using a t test and a p value of <0.05 was considered statistically significant.
Results: Mean MRI-based prostate volume (19.26±8.15 cc) was slightly underestimated (0.73 cc in mean volume) in comparison to TRUS-based volume (20.00±8.71 cc). There were no significant differences in the mean DVH-related parameters except with rectal V100(cc) between TRUS-based and MRI-based preplanning. Mean rectal V100(cc) was 0.74 cc in TRUS-based and 0.29 cc in MRI-based preplanning, respectively, and the values demonstrated a statistical difference.
The postimplant prostate volumes increased by prostatic edema in comparison to preplanning. Postimplant prostate V100 and D90 were decreased in comparison to the MRI-based preplanning. However, there was no statistical difference in the urethral V150(cc), rectal V150(cc), and rectal V100(cc) values between MRI-based preplanning and CT/MRI fusion-based postimplant dosimetry. The rectal V100(cc) value between MRI-based preplanning and CT/MRI fusion-based postimplant dosimetry showed a correlation.
Conclusion: Prostate volume estimation and DVH-related parameters in MRI-based preplanning were almost identical to TRUS-based preplanning. MRI-based preplanning can more accurately predict postimplant rectal dose than TRUS-based preplanning.

4053 POSTER

Comparison of image guidance by megavoltage computed tomography versus simple bone alignment during radiation of prostate cancer

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Background: Helical tomotherapy delivers intensity-modulated radiation therapy and allows image-guidance based on an integrated megavoltage CT (MVCT). Aim of this study was to evaluate the benefit of this image-guidance versus simple bone alignment in radiation of prostate cancer.
Methods and Materials: 10 patients treated for localized prostate cancer with tomotherapy were included. A total dose of 76 Gy was delivered to prostate (GTV). Before each of the 363 fractions a MVCT was performed and the patient was positioned (shift in *x*/*y*/*z*-direction and roll) to match