Materials and methods: The prostate cancer database at the Ottawa Hospital Regional Cancer Centre was examined for relevant demographics, tumour features, treatment parameters, toxicity, and efficacy outcomes. Patients were grouped according to Canadian Consensus Guidelines into low risk (LR) (PSA$\leqslant$10& T1-T2a & Gleason $\leqslant$6) high risk (HR) (PSA >20 &/or T3/T4 &/or Gleason >7) or intermediate risk (IR). Radiotherapy: Initially, three gold fiducial intraprostatic markers were implanted under Ultrasound guidance to ensure accurate targetting of the prostate on the LINAC. Patients were positioned prone with HIP FIX® immobilization. Patients were treated with a 6 field 3DCRT technique using 18 MV photons. Planning Target Volume 1 (PTV1) included Prostate $\pm$ Seminal Vesicles with a 1 cm volume margin. PTV2 was Prostate +5 mm margin. PTV1 was treated to 5600 cGy/28 fractions prescribed to the isocentre and PTV2 dose ranged from 1,000 cGy/5 to 2,000 cGy/10.
Weekly orthogonal portal films were taken and repeat CT planning was carried out if prostate motion greater than 1.0 cm was noted prior to the boost phase. Concurrent and adjuvant hormones for 6–36 months were used in IR and HR patients.
Results: Between 1998 and 2001, 71 men were treated. 84.5% were 75–80 years old and 15.5% were over 80. Median follow up is 44.7 months (range 1.6–71). Risk distribution was LR: 15.5%, IR: 50.7%, HR: 33.8%. 60/71(84.5%) received hormones. The total dose delivered was 66 Gy in one (1.4%), 70 Gy in 2 (2.8%), 72 Gy in 24 (33.8%), 74 Gy in 41 (57.7%) and 76 Gy in 3 (4.2%). RTOG GI and GU toxicity is listed in the table.

	GI pts.			GU pts.		
Grade	Gr 1	Gr 2	Gr 3	Gr 1	Gr 2	Gr 3
Acute	9	8	2	13	2	0
Chronic	9	2	0	9	8	1

No patient has died of prostate cancer. 88.7% remain alive and 11.3% have died for reasons other than prostate cancer. 87.3% remain biochemically free of recurrence and 95.8% have no clinically apparent local failure. The biochemical and local failures have occurred in 0/11 LR, 4/36 IR and 4/24 HR pts. To date, no significant differences in disease free or overall survival have emerged between the risk categories.
Conclusions: This study demonstrates the feasibility, tolerability and efficacy of DECRT in elderly men with prostate cancer.

839 POSTER

The impact of fractionation on acute toxicity in radical radiotherapy for bladder cancer

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Background: The aim of the study is to evaluate the relationship between the fractionation schedule and acute bladder and bowel toxicity in patients with bladder cancer treated with radical radiotherapy.
Methods and Material: A total of 480 patients with T2, T3 bladder cancer, treated with radical radiotherapy between 1975 and 1995, comprise the study group. Radiotherapy was performed with 9–23 MV X photons in 313 patients (65%) or with ^{60}Co photons in 167 patients (35%). The PTV in all patients included the bladder with a margin, but, 299 patients (62%) received initially pelvic irradiation. Mean total radiation dose to the PTV was 65.5 Gy (59.2–72 Gy). Radiotherapy was performed using various fractionation schedules, as follows: conventional fractionation (CF) – once a-day with df-1.6–2.5 Gy, split-course fractionation (SCF) – once a-day with df – 1.6–2.5 Gy, accelerated hyperfractionation (AHF) – twice a-day with df 1.2–1.5, and accelerated hyperfractionated boost (AHB) – pelvis irradiated once a-day with df-2.0 Gy; boost irradiated twice a-day with df-1.3–1.4 Gy. Acute radiation toxicity was assessed with RTOG/EORTC scale. The comparison of the bladder and bowel toxicity was performed among various fractionation schedules.
Results: Acute bladder toxicity was similar with respect to various fractionation schedules; no acute bladder toxicity was observed in 41% to 49% of patients, Grade 1 toxicity ranged from 34% to 37%, and $\geqslant$Grade 2 bladder toxicity ranged from 17% to 26% of patients. The differences were not significant. However, acute bowel toxicity was significantly different in various fractionation schedules ($p = 0.000$). Grade 0 bowel toxicity was observed in 75% of patients in SCF group, 67% in CF, 60% in AHB and 31% in AHF group. Acute $\geqslant$Grade 2 bowel toxicity was observed in 5% of patients in SCF group, 11% in CF, 16% in AHB and 46% in AHF group.
Conclusion: Acute bowel toxicity is highly correlated with fractionation schedule and increases with acceleration of the radiation therapy.

840 POSTER

Assessment of late morbidity after 3D conformal radiotherapy for prostate cancer

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Purpose: To assess the safety of dose escalation with 3D conformal radiotherapy (CRT) in prostate cancer patients and to determine the predictive factors for late genitourinary (GU) and gastrointestinal (GI) toxicity.
Materials and methods: Between September 1998 and November 2003, 252 patients were treated for prostate cancer with 3D CRT in a single institution to a median dose of 72 Gy (69–73.8 Gy). The median age was 71 (51–83). Seventy-two percent of the patients were clinically staged as localized, whereas 28% presented with locally advanced disease. The Gleason score was 2–6 in 43%, 7 in 44% and 8–10 in 13% of the patients. Initial PSA level was less than 10 ng/ml in 53%, between 10–20 ng/ml in 26% and higher than 20 ng/ml in 21%. Favourable risk patients according to Roach formula received treatment to the prostate alone, whereas patients with a risk of >15% of seminal vesicle involvement were treated to the prostate and seminal vesicles to 55.8 Gy and then boosted to the prostate. High risk patients with a risk of >15% lymph node involvement received a whole pelvic irradiation to 45 Gy as the initial part of their treatment. The dose is prescribed to the minimum isodose line (95%) that covers the planning target volume (PTV). Patients were evaluated every 3–6 months after the completion of radiotherapy. RTOG/EORTC late toxicity criteria was used. Univariate estimates of morbidity were calculated with Kaplan-Meier methods and comparisons were made with the long-rank statistics. Cox multivariate regression analysis was used to establish the independent predictors of morbidity. Potential risk factors like age, diabetes, colitis, number of radiation portals, pelvic RT, higher radiation dose, presence of acute toxicity, previous history of TUR-P, time on adjuvant hormones, as well as dose-volume histogram (DVH) features for rectum and bladder were evaluated.
Results: After a median follow-up of 36 months (18–75) the incidence for Grade 3 GI and GU late toxicity was 3.2% and 3.8%, respectively. The actuarial incidence of Grade 2 and higher GI and GU morbidity was 18% and 12% at 5 years, respectively. The independent predictors for Grade 2 and higher GI toxicity were history of colitis ($p = 0.0362$) and presence of acute Grade 2 and 3 GI side effects ($p = 0.0135$). We could not identify any significant clinical nor treatment related risk factors for late GU morbidity. DVH features V70, V60, V50 for rectum and bladder were also not significant in univariate analysis.
Conclusions: We confirm that 3D CRT is a safe method to escalate the dose in prostate cancer patients. As reported also by other institutions colitis could be a predictor for late GI morbidity, therefore patients with a history of colitis should be evaluated for other treatment modalities.

841 POSTER

Biochemical outcome following interstitial low dose rate (LDR) prostate brachytherapy in intermediate and high risk patients

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Introduction: We report biochemical outcome data for intermediate and high risk patients who underwent prostate brachytherapy (BXT) using stranded I-125 implant (RapidStrand), with up to 73 months follow up.
Patients and methods: We have prospectively collected data on PSA outcomes on 600 patients treated to date. Between March 1999 and April 2003, 111 intermediate and 43 high risk patients were treated. Minimum follow up was 24 months (range 24–73 months). Risk status was determined using the Seattle Prognostic Index. Patients received either BXT alone, three months of neoadjuvant androgen deprivation (NAAD) followed by brachytherapy, or 3 months NAAD, 45 Gy pelvic external beam radiotherapy (EBRT) and BXT.
Results: The mean age of patients was 63 years. Within the intermediate group 50% had a PSA >10, 25% had a gleason score $\geqslant$7, and 30% were stage T2c or higher. Within the high risk group 86% had a PSA>10, 65% had a gleason $\geqslant$7, and 76% were stage T2c or higher. Actuarial biochemical free survival (bNED) at 73 months for the intermediate group was 93% and the high risk group also 93%. When stratified by treatment group, intermediate risk patients had actuarial bNEDs of 93% for BXT alone ($n = 15$), 94% for NAAD and BXT ($n = 67$), and 90% for NAAD, EBRT and BXT ($n = 29$). In the high risk group bNEDs were 100% for BXT alone ($n = 2$), 83% for NAAD and BXT($n = 7$) and 94% for NAAD, EBRT and BXT ($n = 34$). Three year median PSA for the intermediate risk group was 0.3 ($n = 47$) and 0.1 ($n = 24$) for the high risk group.

Conclusion: These early results appear to suggest that intermediate and high risk patients can successfully be treated with brachytherapy. Further study is required into the role of external beam radiotherapy and androgen deprivation.

842 POSTER

Postoperative radiotherapy for prostate cancer – evaluation of target motion and treatment technique (intensity modulated versus three-dimensional conformal radiotherapy)

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Background: The aim of the study was to determine the extent of target motion in postprostatectomy radiotherapy and to analyze the value of intensity modulated radiotherapy (IMRT) compared to three-dimensional conformal radiotherapy (3D-CRT).
Material and methods: 20 patients underwent CT scans in supine position with a full bladder (FB) and an empty bladder (EB) before RT and at three dates during the RT series. Displacements of the CTV centre of mass and the posterior border were determined. 3D-CRT and IMRT treatment plans were calculated and compared.
Results: The mean CM displacement (±standard deviation) was 0.5±3.6 mm, −0.6±3.3 mm and 0.0±1.6 mm in the superior-inferior, anterior-posterior and right-left directions respectively. No significant differences were found comparing target motion in serial FB CT scans with EB CT scans. An initially large rectum filling significantly predicted larger displacements (36% vs. 0% posterior displacement >10mm of the mid-CTV border with initial rectum volume of ⩾100 cc vs. <100 cc, $p < 0.01$).
A better homogeneity and a lower conformity results in 3D-CRT compared to IMRT (see table). Bladder dose load is significantly lower with the IMRT technique. Nevertheless, 3D-CRT treatment with FB renders a better bladder sparing compared to IMRT with EB. Concerning the rectum, IMRT offers an advantage in the high dose (100% isodose) area only. However, the integral dose is higher. We could observe a better rectum sparing in the low dose area (⩽50% of the prescription dose) in plans with FB compared to EB.

	IMRT (mean ± standard deviation)	3D-CRT (mean ± standard deviation)	p
Inhomogeneity index (D max-D min/D mean)	0.18±0.07	0.12±0.07	<0.01
Conformity index (volume with 95% dose/PTV)	1.49±0.10	1.89±0.19	<0.01
Bladder volume with 100% dose	1±2%	9±12%	<0.01
Bladder volume with 90% dose	18±11%	28±20%	<0.01
Area under dose-volume histogram for bladder	29±17%	37±23%	<0.01
Rectum volume with 100% dose	0±2%	7±9%	<0.01
Rectum volume with 90% dose	21±10%	19±9%	0.30
Area under dose-volume histogram for rectum	42±9%	39±9%	<0.01

Conclusions: Target position stability was the same in the series with FB compared to EB. A large initial rectum filling has to be avoided to minimize posterior safety margins. IMRT offers an advantage for better bladder sparing in all dose areas and for reducing the rectum and non-target volume in the high dose area – a good option for dose escalation. An adequate bladder filling is paramount to reduce the bladder dose load.

843 POSTER

Prostate brachytherapy in morbidly obese patients

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Background: Morbidly obese patients present challenges for definitive treatment of localized prostate cancer. Treatment can be technically challenging and these patients are often presented with limited options. Lower cure rates and higher rates of complications have been reported in this cohort of patients. We report our experience with transperineal prostate brachytherapy (PB) in morbidly obese patients.
Methods and Materials: Sixteen morbidly obese patients (defined in this study as weight >136 kilograms and Body Mass Index (BMI) of >34) underwent PB between November 1997 and December 2003 at a single institution, had adequate follow up, and completed quality of life surveys. Median height, weight and BMI were 72 inches (range 64–81 inches), 141.6 kilograms (range 136–168.2 kilograms) and 43.6 (range 34.3–52.9), respectively. Median age was 64.6 years. 9 patients were clinical stage T1c, five were T2, one was T3a and one patient could not be clinically staged. All patients were Gleason grade 6 or 7, and mean pretreatment PSA was 8.5±6.4 ng/ml. 7 patients received hormonal therapy and 3 patients received external beam radiation therapy (EBRT) in addition to their modified peripherally loaded seed implant. Median follow-up time was 34.3 months. Quality of implant was assessed by post op CT based dosimetry with D90 and V100. ASTRO consensus definition was used to assess PSA failure. All patients were mailed the University of California-Los Angeles Prostate Cancer Index (UCLA PCI) to assess their urinary, bowel and sexual function and bother. UCLA PCI quality of life scale ranges from 0–100 with higher scores representing better outcomes.
Results: All 16 patients were successfully implanted with no acute perioperative complications. There were no technical issues concerning ability to image the entire prostate nor were there issues with needles being long enough to implant the base. Mean post implant D90 and V100 were 129.6 Gy±36.1 Gy and 86.6%±8.8% respectively. At last follow up there were no PSA failures; mean PSA at last follow up was 0.4 ng/ml±0.3 ng/ml. The mean urinary function and bother scores for the study group was 80.7±20.5 and 73.4±35.9, respectively. The mean bowel function and bother scores for the study group was 84.5±20.0 and 76.5±32.2, respectively. Finally, patient sexual function and sexual bother scores were 31.1±2.7 and 33.9±25, respectively.
Conclusions: Morbid obesity is not a contraindication to performing prostate brachytherapy (PB). PB is technically feasible in morbidly obese patients and appears to result in side effects and cure rates similar to the general PB population.

844 POSTER

Is Iodine allergy a contraindication to prostate brachytherapy using Iodine125?

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Background: Iodine allergy is a frequently mislabeled condition that is often associated with a previous allergic reaction (AR) to shellfish or intravenous contrast medium (IVCM). IgE antibody mediated AR to iodine itself is undocumented and most experts question its existence. AR to seafood is a reaction to proteins in the food such as parvalbumins and tropomyosin. IVCM "anaphylactoid" reaction is the result of osmotic effect and subsequent release of histamines. Regardless, patients who are candidates for I^{125} prostate brachytherapy (PB) experience additional anxiety if they have a suspected Iodine allergy fearing the risk of severe reactions. Our objective was to evaluate the actual incidence of AR to Iodine implants in patients who believed they were allergic to Iodine and underwent an I^{125} PB procedure.
Methods and Materials: We evaluated the treatment records of 3370 patients who underwent PB at a single institution between October 1997 and January 2003. 2698/3370 (80%) patients were implanted with Amersham 6711 I^{125}radioactive seeds. 62/2698 (2.3%) patients reported having an Iodine allergy prior to implant. These patients were contacted by telephone and administered a questionnaire by a staff nurse. Specifically, attention was directed to potential signs and symptoms of an AR. 40/60 (66.7%) patients responded to the telephone questionnaire. 2 patients were deceased at time of phone call due to causes other than prostate cancer and were therefore excluded. Median time to follow-up was 40 months (range 4–76 months).
Results: With a median follow-up time greater than three years, 0/40 (0%) patients reported having any signs or symptoms suggestive of AR related to Amersham 6711 I^{125} implant.
Conclusions: Patients with known Iodine allergies are acceptable candidates for PB using radioactive I^{125} sources. The radioactive Iodine is contained within a titanium enclosure. Therefore, unless this seed capsule is ruptured, I^{125} cannot be released into the bloodstream. Furthermore, if indeed Iodine were to be released into the patient's body, the likelihood of an allergic reaction is negligible. Therefore, patients are not at risk for allergic reactions to the I^{125} sources and prior history of Iodine allergy should not deter appropriate patients from undergoing PB.