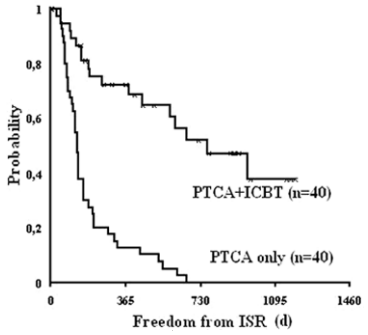

Fig. 1

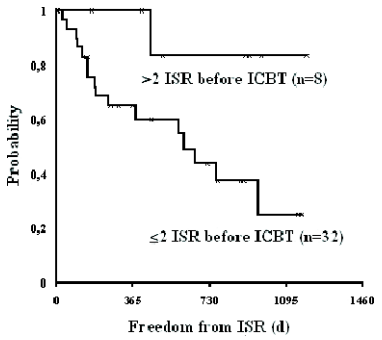

Fig. 2

Conclusion: ICBT is highly effective and save in patients with ISR. Our results are in accordance to the WRIST and BETA-WRIST data that showed an ISR-free-survival-rate of 86% after 1/2 year (WRIST) and 66% (BETA-WRIST). The ISR-rates in our control group (70%) were comparable to the placebo-groups in WRIST (68%) and BETA-WRIST (72%). However, in our study the follow up was longer than in the randomised trials. After 3 years only 38% of the patients were without IRS. Surprisingly, patients with >2 ISR before ICBT had the lowest ISR-rate after ICBT.

1377 POSTER

Movement of the cervix in after-loading brachytherapy: implications for designing external beam radiotherapy boost fields

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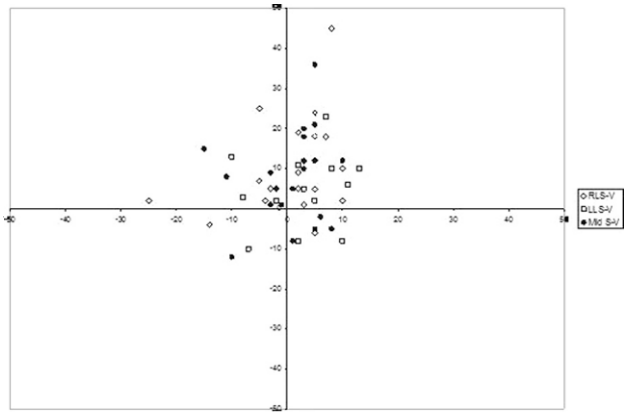
Background: Patients with invasive carcinoma cervix treated by chemoradiotherapy and brachytherapy may also receive pelvic side wall boost using a midline shield (MLS). The purpose of this study is to assess the usefulness of implanted gold grains in detecting the movement of the cervix caused by the insertion of low dose rate brachytherapy applicators and its implication in designing MLS.
Materials and methods: The medical records of 42 patients with various stages of cervical carcinoma, who were treated by radical chemoradiotherapy from August 1999 to December 2003, were reviewed. All of these patients underwent examination under general anaesthesia and gold grain insertion to demarcate the vaginal tumour extent, in the anteroposterior and lateral planes, prior to the start of external beam RT. The isocentric orthogonal films (simulator films) of external RT and brachytherapy were compared to asses the change in position of the gold grains and the consequences for the design of the MLS for parametrial and pelvic side wall boost.
Results: A significant shift in the position of the gold grains was noted in both the *x* (lateral) and the *y* (cranial/caudal) axes, ranging from 1 mm to 46 mm. The median shift of midline, right and left lateral gold grains was 4.5, 5 and 7 mm in the *x*-axis while it was 10, 8, and 9.5 mm in the *y*-axis. The majority of gold grains were shifted both cranially (80%) and laterally (69%). Thirty two patients received parametrial boost RT of which 25(59.3%) patients had a customised, pear-shaped shield and the remaining 7(16.6%) had a straight sided, rectangular MLS. Four patients relapsed locally and 3 of these had been treated using a customised shield. In 2 of these 4 patients, there was an absolute under-dosage of the central pelvis at the tip of the intra-uterine tube, by 50% of the parametrial boost dose (5.4 Gy/3#/3days).



Scatter diagram showing the shift of gold grains in both the *x* and *y*-axes. Lateral shift in the *x*-axis and cranial shift in the *y*-axis are given positive signs. (RLS-V: Right lateral, LLS-V: Left lateral, Mid S-V: Midline gold grains)

Conclusions: The after loading brachytherapy in the management of carcinoma cervix results in significant shift of cervix and under-dosage of the central pelvis while delivering parametrial boost radiotherapy. Although this did not result in a statistically significant local relapse rate, the resulting under-dosage can be avoided by designing customised MLS taking account of the shift in the gold grain markers and potentially improving local control of disease.

1378 POSTER

Dosimetric correlations with radiation esophagitis in intrathoracic malignancy

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Background: Acute radiation esophagitis was assessed according to clinical and dosimetric parameters in patients treated with thoracic radiotherapy (TRT).
Material and methods: Subjects comprised 61 patients who received TRT for lung cancer (n = 43, 70%) or mediastinal malignancies (n = 18, 30%) between February 2000 and April 2005. Median age of patients was 68 years (range, 26–88 years). Underlying pathology was non-small-cell lung cancer (n = 34, 55%), small-cell lung cancer (n = 9, 15%), thymoma (n = 4, 7%), thymic cancer (n = 7, 11%), malignant lymphoma (n = 2, 3%), mediastinal seminoma (n = 1, 2%), mediastinal liposarcoma (n = 1, 2%), or other mediastinal malignancy (n = 3, 5%). A median dose of 60 Gy (range, 40–66.6 Gy) was administered to the isocenter in single daily fractions of 1.8 or 2 Gy. With heterogeneity corrections, median dose administered to the isocenter was 60.0 Gy (range, 39.7–68.2 Gy). A total of 41 patients (67%) were treated with concurrent chemoradiotherapy comprising platinum agent (cisplatin or carboplatin) combined with: paclitaxel (n = 24, 39%); irinotecan hydrochloride (n = 7, 11%); vincristine sulfate and etoposide (n = 2, 3%); vinorelbine ditartrate (n = 1, 2%); etoposide (n = 4, 6%); doxorubicin hydrochloride, cyclophosphamide and etoposide (n = 1, 2%); vindesine sulfate and mitomycin C (n = 1, 2%); or docetaxel (n = 1, 2%). Esophageal toxicities were graded according to Radiation Therapy Oncology Group criteria. The following factors were analyzed with respect to associations with Grade 1 or worse esophagitis using univariate and multivariate analyses: age; gender; concurrent chemotherapy; chemotherapeutic agents; overall duration of TRT; maximal esophageal dose; mean esophageal dose (D mean); and percentage of esophageal volume receiving >10 Gy (V10) to >65 Gy (V65) in 5 Gy increments.
Results: A total of 43 patients (70%) developed acute esophagitis: Grade 1, n = 36 (59%); or Grade 2, n = 7 (11%). No patients displayed acute esophageal toxicity of Grade 3 or worse. Univariate analysis revealed significant associations with esophagitis for D mean ($p = 0.007$), V10-V55 ($p<0.05$) and chemotherapeutic agents ($p = 0.015$). The most significant correlation was between esophagitis and V35 on univariate ($p = 0.001$) and multivariate analyses ($p = 0.020$).
Conclusions: V35 was the most significant factor associated with mild acute esophagitis.

Table: Spearman's correlation between dosimetric parameters and esophagitis

Parameter	Correlation coefficient	P
Dmax (Gy)	0.226	0.080
Dmean (Gy)	0.342	0.007
V10 (%)	0.297	0.020
V15 (%)	0.301	0.018
V20 (%)	0.309	0.016
V25 (%)	0.304	0.017
V30 (%)	0.370	0.003
V35 (%)	0.419	0.001*
V40 (%)	0.405	0.001
V45 (%)	0.357	0.005
V50 (%)	0.333	0.009
V55 (%)	0.259	0.044
V60 (%)	0.134	0.304
V65 (%)	-0.047	0.718

Abbreviations: Dmax = maximal esophageal dose; Dmean = mean esophageal dose; V10-V65 = percentage of esophageal volume receiving > 10 to 65 Gy; *Greatest statistical significance

1379 POSTER

High-dose rate brachytherapy in uterine cervix cancer: local control, survival and complications of a 10-year Brazilian protocol

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Objectives: Evaluate survival, local control and complications of irradiation alone in the treatment of uterine cervix cancer.
Methods: 874 women treated from January 1991 to December 2001, with squamous cell carcinoma, adenocarcinoma and adenosquamous cell carcinoma of the uterine cervix with no prior treatment. Patients' median age was 53 years (24–85) with a 52 months (6 – 71) median follow-up. The pelvis received 39.6 Gy in a four-field box technique, 1.8 Gy daily, 5 times a week. High-dose rate brachytherapy (HDR) was delivered in 4 weekly fractions of 7 Gy, concomitantly with external radiation (ER). The parametria received a boost of 10–20 Gy, according to clinical stage. The disease free survival and overall survival were calculated by Kaplan Meier actuarial method.
Results: Disease free and overall survival were 67.3% and 65.3% respectively. For clinical stage IB, disease free survival was 90.9%, 84.2% for IIA, 73.2% for IIB, 50% for IIIA, 51.5% for IIIB and 40% for IVA. Karnofsky performance status, clinical stage, tumor volume, and bilateral parametria involvement, negatively influenced local control ($p < 0.001$). The 5-year actuarial survival rates were better for patients with lower clinical stage, no bilateral parametria involvement and tumors <4 cm ($p = 0.05$). Rectal complications were observed in 61 (6.9%) patients, only 14 (1.6%) presented grade 3 and 4, and minor bladder complications in 30 (3.4%).
Conclusion: The results suggest that the association of HDR and ER is a practical, reliable and feasible method of treatment of uterine cervix carcinoma. The results are similar to the worldwide literature and complication rates are low and comparable to conventional techniques.

1380 POSTER

Three-dimensional conformal radiation therapy (3D-CRT) in the treatment of locally advanced non-small cell lung cancer (LAD-NSCLC): Influence of clinical and dosimetric parameters on patterns of failure and survival

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Background: 3D-CRT selects optimal treatment to increase tumor dose and reduce normal tissue dose, potentially representing an enhancement of the therapeutic ratio of radiation therapy for LAD-NSCLC. The purpose of this study was to assess failure patterns and survival.
Material and methods: Between April 1995 and March 2001, 80 pts (72 males and 8 females; median age: 58 years, range: 32–78) with stage IIIA (20%) and IIIB (80%) NSCLC were treated with cisplatin-based induction chemotherapy (ICT) followed by concurrent chemotherapy (CCT) and hyperfractioned 3D-CRT (1.2 Gy b.i.d.; median dose: 72.41 Gy, range: 54.13–85.89). Potential predictive factors evaluated included clinical parameters (sex, age, performance status, stage, histology, weight loss >5%, tumor site, pre-existing lung disease), therapeutic factors (IQT schedule, 3D-CRT dose, treatment response), and dosimetric factors according to the ICRU definitions (volume and dose of GTV, PTV-2, CTV y PTV-1). Local recurrences were dosimetrically analyzed using dose-volume histograms after definition of the recurrent tumor volumes with the pretreatment CT dataset. Recurrences were divided into four categories, in terms of percentage of recurrent tumor volume located within the high-dose region (95% of the prescription dose): recurrences with more than 95% of their volume within the high dose region were considered "central"; those within 80% to 95%, 20% to 80%, and less than 20% were considered "in-field", "marginal", and "extreme", respectively. The overall survival (OS) and local/distant failure free survival (LFF/DFF) were obtained using the Kaplan-Meier method. Univariate and multivariate analyses were performed.
Results: All patients complete IQT and 3D-CRT. Fifty five pts (82%) received the prescribed CCT. Analysis of the 77 evaluable pts showed that the patterns of failure were loco-regional in 12%, distant metastases in 42% and both in 13%. Loco-regional recurrences were classified as central in 31%, in-field in 16%, marginal in 42%, and extreme in 10%. With a median of follow-up of 4.5 years (range: 13–98 months), the median OS and LFF were 20 months and not reached yet, respectively. The 2 and 5 year OS and LFF were 47% and 9%, and 71% and 54%, respectively. Multivariate analysis showed that age $\geqslant 60$ years, ($HR = 2.47$, $p = 0.01$), GTV >270 cc ($HR = 2.87$, $p = 0.03$), and mean lung dose >25 Gy ($HR = 1.8$, $p = 0.04$), were independently associated with worse OS; PTV-1 >1146 cc ($HR = 3.54$, $p = 0.007$) was the only factor independently associated with worse LFF; and female gender ($HR = 3.7$, $p = 0.003$), nodal stage N3 ($HR = 3.77$, $p = 0.02$) and GTV >270 cc ($HR = 1.1$, $p = 0.02$) were associated with worse DFF.
Conclusions: This study shows that local control was acceptable and was independently related with the PTV-1 size. The great majority of loco-regional recurrences were centrally located (into the high-dose region). Age, GTV and mean lung dose were independent prognostic factors of overall survival. Dosimetric and clinical parameters may contribute to improve radiation therapy results n multidisciplinary protocols of patients with LAD-NSCLC.

1381 POSTER

Prostate and pelvis radiotherapy using IMRT and ultra small superparamagnetic nano-particles to optimise dose to involved lymph nodes

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Purpose: To demonstrate how ferumoxtran (Sinerem) enhanced MRI may help to define the clinical target volume for a lymph node boost with intensity modulated radiotherapy (IMRT) in patients with prostate cancer and pelvic nodal involvement.
Patients and methods: As part of an ongoing phase I dose escalation trial, patients with prostate cancer and either a high risk of, or with overt pelvic nodal involvement are treated with 3 years of androgen deprivation and radiotherapy to the prostate (70 Gy) and pelvic lymph nodes (60 Gy) using an IMRT technique. Overtly involved lymph nodes are boosted with a further 5 Gy. Two patients with prior suggestion of pelvic nodal involvement radiologically, underwent MRI before and after administration of the ultrasmall superparamagnetic iron oxide (USPIO) contrast agent ferumoxtran (Sinerem®, Guerbet, Paris, France). A novel flat top couch insert was used for MRI scanning to give better comparability with the planning CT scan. The MR images were used in conjunction with the planning CT to define the nodal boost volume.
Results: Pre-treatment imaging had demonstrated suspicious lymph node enlargement in both obturator regions in one patient and the pre-sacral region in the other. At the time of planning CT and ferumoxtran contrasted MRI, each patient had received androgen deprivation for 12 months. For the first patient, the radiotherapy planning CT scan showed probable lymph nodes at the previously noted sites, with the left obturator node measuring 8 mm in its short axis diameter. MRI following ferumoxtran showed signal retention typical of malignant infiltration at the sites of previously suspected lymphadenopathy, whereas there was the expected signal loss due to uptake of USPIO contrast in other nodal areas. Fig 1a and 1b show the pre and post ferumoxtran MR images respectively for the first patient. A suspicious lymph node in the left obturator region is arrowed. The MR images facilitated segmentation of the suspicious lymph nodes using co-