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-