RLN metastasis. In N(0) disease, the presence of RLN metastasis was also a significant independent predictor for DMFS.
The aim of this report is to retrospectively review a cohort treated at our centre between 1992–1994, and to examine if the presence of RLN resulted in an increased incidence of distant metastases, especially in patients with otherwise N(0) disease.
Materials and Methods: A review was conducted on case records of 662 patients with histologically proven, non-metastatic NPC staged with CT scans and treated with radical radiotherapy (RT) alone on standard protocols. None received adjuvant chemotherapy.
Patients with obvious RLN on CT scans as well as patients with "parapharyngeal" extension to below C1/C2 level were deemed to have RLN. This criteria was based on our previous study comparing CT with MRI, where about 51% of RLNs were present below C1/C2 level. It has also been shown that most parapharyngeal involvement seen on CT appears to be retropharyngeal nodes on MRI. The AJCC/UICC Staging (6th edition) was retrospectively applied based on the original clinical and CT findings.
Results: Median follow-up for all patients was 5.1 years, and 11 years for patients alive at time of censorship. Median age was 48 years. 73% were male and 88.8% were of WHO Type 3 histology. 178 (24.7%) were staged N(0) of which 44 (24.7%) had RLN.
The 5-year DMFS after adjustment by age and sex were 91% for N(0) without RLN, and 78% for N(0) with RLN. The adjusted 5-year DMFS for N1 patients was 68%. The hazard ratios after adjustment by age, sex, and T-stage of N(0) with RLN, and N1 patients compared to the N(0) without RLN patients were 2.1 (95% CI, 0.9−4.7) and 3.6 (2.1−6.2) respectively.
Although the DMFS of N(0) with RLN patients was only marginally different than N(0) without RLN ($p = 0.071$), the DMFS of N(0) with RLN was not significantly different than N1 ($p = 0.101$).
Conclusion: Our study suggests that N(0) patients with RLN have a poorer DMFS compared to patients without RLN metastases, and have a similar outcome to N1 patients. Hence, we would recommend that the presence of RLN should now be considered as "N" disease in future staging systems for NPC.

5526 POSTER

Xerostomia and related quality of life in patients treated with intensity modulated radiation therapy for nasopharyngeal cancer: initial report of a prospective study

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Purpose: To evaluate xerostomia and related quality of life in patients treated with Intensity Modulated Radiation Therapy (IMRT) for nasopharyngeal cancer.
Material and Methods: A prospective study was initiated in May 2003. The first 8 patients (Group I) were treated with a 5 field IMRT technique and the following 20 (Group II) with a 7 field technique. Salivary gland toxicity was evaluated using the RTOG scale, salivary flow (SF), and a xerostomia related questionnaire (XQ). The assessments were done before the beginning of therapy and at 3, 6, 12, 18 and 24 months after the end of radiotherapy.
Results: Twenty-eight patients with at least 6 months follow up are included in this initial report. The mean parotid dose was 35.8 Gy for the entire population, 45.5 Gy for Group I and 31.9 Gy for Group II. The difference between Group I and Group II parotid gland mean DVHs was statistically significant $p = 0.0001$. Using the RTOG scale, in group II there was no G3 toxicity and 28% of the patients were G0 at 18 months, while 25% of the patients in Group I were G3 and none was G0 at 18 months. Analysis of the SF showed that at 18 months, 80% of the patients in group II while only 53% in group I recovered at least 25% of their pre-therapy value. A strong trend toward correlation was observed between a mean parotid dose of less than 32 Gy and the stimulated SF recovery of more than 25% at 12 months ($p = 0.056$) A significant correlation was also found between the volume of the glands that received a dose of more than 25, 30, and 35 Gy (V25, V30 and V35) and the recovery of the SSF >25% at 12 months.
The XQ score showed a similar change in time as the SF. The stimulated SF showed a statistically significant correlation with the XQ score at any time (with a p value ranging from 0.018 to 0.036). Questions evaluating the sleeping and tasting functions and the need to sip water during the day, showed the greatest improvements (p ranging from 0.03 to 0.05).
Conclusion: The use of IMRT for the treatment of nasopharyngeal cancer allows a decrease in the parotid gland mean dose and reduces salivary gland toxicity. An increase in saliva translated into an improvement in the patients' perception of xerostomia related side effects.

5527 POSTER

High dose rate brachytherapy as a boost to radio-chemotherapy in base of tongue cancer

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Background: Interstitial boost to external beam irradiation (EBI) with low dose rate (LDR) BT in cancer of the base of tongue results in improved local control without additional toxicity compared to EBI alone. Data for HDR BT are scarce; however, compared to LDR BT this technique has the advantage of less radiation exposure for medical staff. The purpose of this study was to assess feasibility and short term clinical outcome of interstitial HDR BT and radio-chemotherapy in cancer of base of tongue.
Materials and Methods: Between 02/2003 and 02/2006, 20 patients (pts) with cancer of base of tongue were treated with HDR BT followed by EBI and concurrent chemotherapy. Their median age was 59 (46−83) years. AJCC stage was I/II in two pts, III in six and IVa in twelve pts. Fourteen pts had positive cervical lymph nodes. Neck dissection was carried out in 7/20 pts. Concomitant platinum based chemotherapy was given in all but one patient. A median number of five (2−9) applicators were implanted under general anaesthesia. After CT based treatment planning, HDR BT was delivered by an afterloading unit with an iridium-192 source. The median planning target volume was 37 (12–118) ccm. The median coverage (V100) was 92 (86−97)% of the target volume. The median HDR target dose was 24 (9−32) Gy, the median EBI dose 60 (50−72) Gy.
Results: At a median follow-up of 18 (5−41) months, 17 pts (85%) were alive, 14 pts (70%) without evidence of disease. One patient had died due to regional, one due to distant progression and one from unclear reason. Local control at the base of the tongue at time of death or last follow-up was 90% (two pts with initial T3/4 disease locally relapsed), Regional control 70%, two pts developed distant metastases.
There were no perioperative complications due to the implant. Two pts suffered radionecrosis of mandible during follow-up.
Conclusions: These preliminary data suggest that HDR BT as a boost prior to radio-chemotherapy results in excellent local control, regional control comparable to literature and acceptable toxicity.

5528 POSTER

Non-surgical treatment of the neck in cN+ oropharyngeal squamous cell carcinoma

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Background: Squamous cell carcinoma (SCC) of the oropharynx often presents with lymph node metastases. The treatment of the clinically positive neck (cN+) can be primarily surgical or with radiotherapy (RT) or concomitant radio-chemotherapy (RChT). A R(Ch)T approach might result in lower chronic morbidity, like neck fibrosis, but possibly at the cost of a higher regional failure rate.
Materials and Methods: Between 2000 and 2004, 157 patients (pts) with oropharyngeal SCC were treated at our institution. Of these, 94 pts had cN+ disease. 31 pts were excluded for various reasons (previous neck dissection, palliative intent, etc.), leaving 63 pts for this retrospective analysis. 28 of them (44%) received neo-adjuvant ChT (N-ChT), followed by RChT in 11 and RT only in 17 pts. Fourteen pts (22%) were treated with RChT, and 21 (33%) received RT only. Median RT dose was 70 Gy. Response evaluation (RE) was performed at 2 months after the end of RT. The endpoints were: RE of the primary tumour and the involved neck, overall survival (OS), local control (LC), regional control (RC) and distant recurrence (DR). When less than a complete response (CR) was achieved, the date of RE was used as event date for LC and RC.
Results: T- and N-classification are shown in Table 1. Median follow-up (FU) in survivors was 46 months. A CR was obtained in 49 pts (78%) for the primary tumour, and in 50 (79%) for the neck. Median OS was 31 months, with a 2-year (2Y) and 4-year (4Y) OS of 60% and 43%, respectively. LC rates were 70% at 68% at 2Y and 4Y, respectively. The 2Y and 4Y LC rates raised to 87% and 84% for pts who achieved a CR for the primary tumour. The 2Y and 4Y RC were both 66%, with a 1Y RC of 74%. There were no regional relapses occuring after 24 months of FU. In pts achieving a CR in the neck, RC was 90% at 1 year, while the 2Y RC was 80%. No significant difference was found in RC between pts receiving N-ChT (1Y RC 77%) or not (1Y RC 71%). The 1Y RC for pts who had received RChT was 84%, while this was 67% in those not receiving RChT. Isolated regional recurrence as first site of relapse was seen in 5 pts (8%), of whom 2 could be salvaged surgically. During FU, DR was diagnosed in 13 pts (21%), 5 of whom had received N-ChT.

Conclusion: In this retrospective analysis, a non-surgical approach leads to a high RC in cN+ SCC of the oropharynx.

Table 1: T- and N-classification (UICC 2002)

	N1	N2a/b	N2c	N3
T1	2	3	-	2
T2	9	5	-	2
T3	3	9	5	-
4	1	13	8	1

5529 POSTER

Hyperfractionated radiation therapy and cisplatin for locally-advanced head and neck cancer (LAHNC). Experience of the Hospital de Navarra

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Purpose: to assess toxicity, quality of life, and activity of the two schemes of hyperfractionation with the same concommitant chemotherapy used at our Center during 2000–2004 for LAHNC patients.
Material and Method: Seventy three patients were treated from January 2000 to December 2004. First 30 p. were treated with Accelerated Fractionation with Concomitant Boost (AFX-C) at 1.8 Gy/fx/d. 5 days/wk to large field + 1.5 Gy/fx/d to boost field for the last 12 treatment days to a total dose of 72 Gy/42fx/6 wks., and chemotherapy consisting of cisplatin, 20 mg/sqm/day, 5 days, in continuous perfusion, on weeks 1 and 5 of radiation. The last 30 patients received the same chemotherapy, and Hyperfractionation (HFX) at 1.2 Gy/fx, B.I.D, 5days/week to a total dose of 76.8 Gy to 81.6 Gy. Both groups had similar characteristics. Stage IV(AJCC) 94% in AFX-C group against 88% in HFX.Acute normal tissue effects were graded with the RTOG radiation morbidity scoring criteris. Quality of life was assessed usin the EORTC questionnaires QLQ-C30 and H&N 35. All the time related end points were estimated using the Kaplan-Meier method.
Results: 2-year locol control for both treatments were similar (54% a 67%, p = ns). Grade 3+ acute cutaneous toxicity appeared in 43% (AFX-C) and 23% (HFX). Grade 3+ mucositis in 93% and 57%, respectively. Quality of life scores are acceptable in general. Patients who receive the treatments can adequately stand them. There are alterations during the treatment period in some toxicity, functioning and psychosocial areas. Clinical data and quality of life scores are better in one of the two treatment protocols compared (HFX).
Conclusions: In our experience, both treatments have similar activity, but when combinig with cisplatin, AFX-C has more grade 3−4 acute toxicity than HFX. Nevertheless, QL scores shows that both treatments are tolerables by the patients.

5530 POSTER

Locoregional failures after IMRT alone for oropharyngeal cancer: would a traditional approach have been better?

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Background: Since IMRT provides greater conformality of high dose distributions compared to traditional conformal 3-field technique (3FT) and since we have shown that electively treated regions often receive a higher than prescribed dose just because they are in the trajectory of boost fields (Rao et al, ASTRO 2006), we cannot exclude that 3FT may avoid some IMRT treatment failures, particularly if outside the IMRT high dose region.
Materials and Methods: We analyzed patients treated at UTMB from 05/02 to 02/06 that met the following criteria: 1. local (LF) or regional failure (RF) following definitive IMRT alone (no chemotherapy) for oropharynx SCC; 2. no surgery except pretreatment tonsillectomy or neck dissection after IMRT (residual disease at neck dissection was considered RF); 3. minimum f/u of 12 mo from treatment end. Failures were investigated as follows: the diagnostic imaging study containing the failure was co-registered with the initial pretreatment planning CT; the failure was contoured and expanded by 5 mm to obtain a PTV of the failure (PTV-fail); a traditional conformal 3-field-based (3FT) plan, targeting the same high dose PTVs at the same dose per fractionation as the original IMRT plan, was generated for comparison; the PTV-fail mean dose, as a percentage of the gross disease prescription dose (MD%) was recorded for each plan. If ⩾95% of the PTV-fail was encompassed by ⩾95% of the MD% by the IMRT plan, the failure was designated a "within high dose failure" (WHDF). If not, the failure was designated an "outside high dose failure" (OHDF). IMRT and 3FT plans were compared by PTV-fail MD%.
Results: Three LF and six RF occurred in eight pts. Time to failure and dosimetric comparison details are reported in the table. Four failures were scored as WHDF. The remaining five failures were considered OHDF. Wilcoxon t test showed no difference b/w IMRT and 3FT plans in terms of PTV-fail MD%, considering all failures (p = 0.007) or only OHDF (p = 0.12).

Failure		IMRT PLAN		3FT PLAN	MD% Difference
Site	Time to failure (mo)	MD%	Possible reason for failure	MD%	(3FT – IMRT)
RF	2.5	103.1	WHDF	99.2	−3.8
RF	35.2	103.0	WHDF	99.0	−4.0
LF	10.3	104.4	WHDF	98.1	−6.3
LF	3.3	102.2	WHDF	98.6	−3.6
LF	14	99.9	OHDF	94.6	−5.3
RF	20.8	35.0	OHDF	37.4	2.4
RF	12.2	85.6	OHDF	76.8	−8.8
RF	3.3	83.2	OHDF	76.9	−6.3
RF	13.1	84.1	OHDF	73.1	−11.0

Conclusion: These data reject that 3FT would have treated these failures to a higher dose.

5531 POSTER

PET/CT guided IMRT in head and neck cancer: impact on treatment planning and local control: Early results

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Purpose: To evaluate the impact of positron emission tomography (PET)/computed tomography (CT) fusion imaging on treatment planning in head and neck cancer patients treated with intensity modulated radiotherapy (IMRT) and to assess the role of PET/CT in the evaluation of tumor response
Methods and Materials: Twenty-five patients, 4 women and 21 men, who underwent PET/CT simulation from August 2005 through August 2006 were enrolled in this study. Median patient age was 56 years. Tumor location varied from 15 in the nasopharynx, 5 in the larynx, to 1 in the tonsil, cervical esophagus, pyriform sinus, base of tongue and retromolar trigone. All patients had intact squamous cell carcinomas and presented for curative radiotherapy at our department. Initial T stage was 1−2 in 12, 3−4 in 13 and initial N stage was 0 in 11, 1−3 in 14 patients. All imaging and data acquisition was performed on an integrated PET/CT system in the treatment position. No contrast medium was used for the CT examination. On the fused PET/CT images GTV (gross tumor and involved lymph nodes) was contoured by a radiation oncologist and neuroradiologist after the PET images were reviewed by a nuclear medicine physician. All patients underwent definitive IMRT with a Simultaneous Integrated Boost technique. Sixty-eight percent received concomitant chemotherapy (CT), 12% neoadjuvant and concomitant CT, and 4% concomitant Cituximab. A follow-up PET/CT scan was performed in 96% of the patients median 5 months (range 3−14 months) after the end of the therapy.
Results: PET/CT up-staged the N-stage in16% (4/25) and M-stage in 4% (1/25) of patients. Two patients were diagnosed with biopsy proven additional primary lung cancers. After a median follow-up of 11 months (range, 6−18 months) two patients with advanced supraglottic primaries invading the thyroid cartilage had biopsy proven recurrent disease, one in the primary site, the other one in thyroid gland. Two patients had suspicious residual disease on the follow up PET/CT, but pathologic evaluation revealed no evidence of persistent disease.
Conclusions: PET/CT fusion enables better visualisation of local and locoregional tumor extension and has the potential for reducing the risk of geographic misses. In this study, we demonstrated that PET/CT simulation lead to changes in treatment planning and management in 7/25 patients. PET/CT was also useful to predict the local recurrences in two patients. This cohort of patients will be followed to investigate the relationship between PET/CT response metrics and patterns of failure and survival.