following which a booster of 6 to 20Gy was given to the resection site or to the macroscopic tumor with 1 cm margins (PTV2). In all patients the contralateral parotid gland was included in the optimatization process as an organ at risk, and in 16 cases also the dose of the contralateral submandibular gland was minimized. The mean total dose to the protected parotid glands was 23.4 Gy (range, 16.2 to 32.2 Gy) and to the submandibular glands 26.3 Gy (range, 21.0 to 34.4 Gy).
The total basal and stimulated salivary flow was assessed before RT and at 6 and 12 months following RT. Xerostomia-related symptoms were scored using the SOMA scale.

Table 1.

	Submandibular gland dose	Decline in basal secretion		Subjective xerostomia at 12 mo	
	Mean	At 6 mo	At 12 mo	Grade 0–1	Grade 2–4
Group 1 (n = 16)	26.3 Gy	36±6%	40±7%	74%	26%
Group 2 (n = 19)	50 Gy	64±6%	62±7%	38%	62%
		$p < 0.05$	$p < 0.05$		$p < 0.05$

Conclusion: Sparing of the submandibular glands using IMRT results in significantly better basal salivary secretion and less symptoms of xerostomia. No locoregional recurrences near the spared salivary glands were observed.

1040 POSTER

Phase II study of concurrent chemoradiotherapy with capecitabine and cisplatin in patients with locally advanced squamous cell carcinoma of the head and neck

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Objectives: The objectives of the present study were to evaluate the efficacy and safety of concurrent chemoradiotherapy with capecitabine and cisplatin in patients with locally advanced squamous cell carcinoma of the head and neck (SCCHN).
Patients and methods: Thirty-seven previously untreated, histologically confirmed patients with stage III or IV SCCHN were enrolled into the study. Chemotherapy consisted of two cycles of intravenous cisplatin of 80 mg/m^2 on day 1 and oral capecitabine 825 mg/m^2 twice daily from day 1 to 14 in a 3-week interval. Radiotherapy (1.8–2.0 Gy 1 fraction/day to a total dose of 70.2 to 72 Gy) was delivered to the primary tumor site and neck and was targeted to begin on the first day of chemotherapy.
Results: The median age of patients was 61.0 years (range, 35–75 years), and 31 (83.8%) patients were male. Primary sites of tumors were as follows: oral cavity (n = 6), oropharynx (n = 11), hypopharynx (n = 8), larynx (n = 3), nasopharynx (n = 6), and paranasal sinus (n = 3). Thirty-four (91.2%) out of 37 patients completed the planned treatment. After the chemoradiotherapy, 29 complete responses (CR; 78.4%) and 6 partial responses (PR; 16.2%) were confirmed, giving an overall response rate of 94.6%. Grade 3 or 4 neutropenia occurred in only 2 patients (5.4%), and grade 3 febrile neutropenia was observed in 1patients (2.7%). There was no treatment-related death. The common non-hematological toxicities were mucositis (grade 3/4, 67.6%) and dermatitis (grade 3/4, 24.3%). At a median follow-up duration of 303 days (range, 85–703 days), median survival has not yet been reached, while the estimated overall survival and progression free survival at 1-year was 90.5±5.3% and 59.9±9.1%, respectively.
Conclusions: Concurrent chemoradiotherapy with capecitabine and cisplatin was found to be well-tolerated and effective in patients with locally advanced SCCHN. Long-term follow-up is warranted to evaluate the late treatment failure and complications.

1041 POSTER

A historical cohort study of Parotid gland malignancies in Manitoba – the Canadian experience

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Introduction: Parotid cancer is characterized by a complex and diverse group of tumours with a variable outcome. The objective of this study was to identify significant prognostic factors that can be used in clinical decision making.
Methods: A historical cohort study of 184 patients with parotid gland malignancy registered in the province of Manitoba from 1970 to 2003 was examined. Survival analysis using Kaplan Meier curves and log-rank test for comparing subgroups was used. The independent effect of factors that predicted survival at the bivariate level was determined using a Cox's proportional hazard model.
Results: The mean age at presentation was 60.50±18.2 years with a male to female ratio of 1.5:1. The mean and median follow-up was 64 and 32 months respectively. The most common presentation was a painless mass (n = 116). Pain was an associated symptom in 33 and facial nerve involvement was documented in 26 patients. Histology included mucoepidermoid carcinoma (21%), acinic cell carcinoma (18.4%), adenoid cystic (14.6%), adenocarcinoma (11.4%) and other (34.6%). Thirty-four patients had stage I, and 55, 29, and 50 patients Stages III-IV disease respectively. The treatment modalities in 161 patients treated with curative intent included radiotherapy (8.9%), surgery (28.9%), and surgery and radiotherapy (56.7%). Twenty-three patients had persistent disease after treatment. Recurrence was noted in 66 patients: 45 had locoregional disease and 21 failed at distant sites. Absolute and disease specific survival at 5 years was 41.70% and 57.94%. Survival for Stages I to IV at 5 years was 85.35%, 76.9%, 56.1% and 8.4% ($P < 0.0001$). Factors with an independent effect on survival ($P < 0.05$) included age, tumor size (per cm), local invasion (T4 vs. T1), distant metastasis, tumour differentiation and treatment. Adjunctive radiotherapy reduced the risk of death from disease at 5 years by 50% (HR 0.5; CI 0.228, 0.995; $P = 0.0486$).
Conclusion: Despite the diverse variety of malignant parotid tumors there are easily identifiable prognostic indicators, such as advanced age, tumor size, local invasion, and tumor differentiation that have a significant impact on outcome. Patients with adverse prognostic factors benefit from adjunctive radiotherapy and the threshold for the use of adjunctive radiotherapy in managing parotid malignancy should be low.

1042 POSTER

Parotid scintigraphy as a tool to assess salivary gland dysfunction after radiotherapy in head and neck cancer patients

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Background: Radiotherapy in H&N region may lead to xerostomia. The purpose of this study is to prove the correlations between the radiation doses in parotid and submandibular glands and their salivary extraction fractions (SEF) measured by dynamic scintigraphy.
Material and methods: In 20 patients with pharyngeal and laryngeal cancer irradiated to total dose in range 62.5–72 Gy parotid and submandibular SEF were measured. Parotid and submandibular gland dose-volume histograms were obtained from 3D-computer treatment planning. SEF measurements were performed before (baseline) and 6 weeks after radiotherapy by 185 MBq 99Tc injected intravenously. Parotid and submandibular SEF rates were analysed in relation to radiation doses accumulated in (mean doses were respectively 34.8 Gy±8.5 Gy and 58 Gy±8.7 Gy, minimal doses were respectively 11.3 Gy±7.3 Gy and 46.4 Gy±10.9 Gy).
Results: Pre- and post-treatment SEF was measured for 40 submandibular and 40 parotids. Six weeks after radiotherapy SEF was generally lower by 51% but in 6th month was lower by 55% compared to the pre-treatment values. There was a significant correlation between SEF-ratios after 6 weeks of completing radiotherapy and radiation dose delivered to parotids ($r = -0.67$, $p = 0.002$). For submandibular glands there was no correlation between SEF ratios and radiation dose. There was also significant correlation between SEF-ratios after 6 weeks ($p = 0.02$) and % of irradiated volume of parotids.
Conclusions: The amount of SEF in parotid glands measured 6 weeks after radiotherapy clearly reflects dose-response relationship of irradiated

salivary tissue. Radiation doses accumulated in submandibular glands much exceeded threshold doses of salivary tissue. This prospective study has been continued.

1043 POSTER

Role of Candida spp. in oral mucositis. Methods of correction

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More aggressive treatment regimes improve local control and survival of patients with locally-advanced head and neck cancer, but are usually associated with higher acute mucosal toxicity. Pathogenesis of mucositis is complex and involves the interaction of cellular, tissue, and oral environmental factors. The purpose of the work was to study the influence of Candida species on severity and frequency of mucositis in patients with head and neck cancer and to propose methods of prophylaxis.
Since October 2002 to November 2004, 64 patients with stage III-IV head and neck cancer were randomized for standard correction of mucositis (arm A), standard correction + klotrimasol (Kandid-solution for oral cavity®) (arm B), standard correction + Immunal® (arm C), standard correction + klotrimasol + Immunal (arm D). Immunal is an immuno preparation made from Echinacea purple. All of them were performed concurrent chemoradiation therapy. Quantity of colony-forming unit (CFU) of Candida species in oral cavity was estimated before treatment and after total dose 40 Gy. Mucosal toxicity was scored according to RTOG/EORTC criteria. Standard correction consisted from antibacterials, fungicides, processing of oral cavity by broth of chamomile.
In arm A (18 patients), Candida was isolated in 17.7% of patients before treatment and in 88.2% after the dose of 40 Gy. Average quantity of CFU was 281 and 5721, respectively ($p = 0.004$). In arm B (17 patients), Candida species were isolated in 18% and 23.5% cases, respectively. CFU was 194 vs 4275 ($p = 0.08$). In arm C (14 patients), Candida species were observed in 21.4% and 78.6% of patients. Average CFU quantity was 228 vs 4681 ($p = 0.07$). In arm D (15 patients), C.albicans was detected in 26.7% patients before treatment. After the dose of 40 Gy, all the patients were free from Candida in oral cavity.
Changes of microflora in oral cavity correlated with severity and frequency of acute mucosal reactions. Arm A developed 75.3% grade 3+4 mucositis, arm B – 68.8%, arm C – 63.6%, arm D – 18.2%. Arm A and D demonstrated significant difference ($p = 0.004$), differences between A and B ($p = 0.09$) A and C ($p = 0.07$) were non-significant.
Conclusion: Candida spp. of oral cavity play a great role in acute mucosal toxicity. Local correction of oral micro flora combined with immunomodulation significantly decreases severity and frequency of mucositis.

1044 POSTER

Impact on radiation oncology department workload of daily IMRT treatments in patients with head and neck cancer: results from a comparative study

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Background: Notwithstanding a possible improvement in dose distribution, the general impression of intensity modulated radiotherapy (IMRT) is that it is labor intensive, requiring long treatment and planning times. This study evaluates the impact of this technology on the workload of a radiation oncology department through the following end points: daily and overall treatment time and total treatment preparation time (contouring, treatment planning, quality assurance (QA), mould room).
Materials & methods: Ten patients undergoing treatment with IMRT for head and neck tumors were compared to ten similar patients treated with a conventional technique. IMRT treatment was delivered with five to seven gantry angles (five to fourteen fields) dynamic delivery with a single plan. Doses ranged from 50–70 Gy in 25–33 fractions. Conventional patients were treated with a standard multi-phase plan including lateral opposed fields for upper neck, off-cord block, posterior neck node electrons, and a half blocked (single isocenter) lower anterior neck field. Dose consisted of 70 Gy in 35 fractions. Treatment time per patient was recorded daily for 5 days. Treatment planning data was obtained from two radiation oncologists, two physicists, four dosimetrists and the mould room technologist.
Results: Average daily treatment time for IMRT was 18min±2min and 9min±1min for conventional technique. Average overall treatment time for IMRT was 7.5hrs and 11hrs for 25 and 33 fractions respectively. The conventional technique averaged 6.5hrs for 35 fractions. Physicists required 4hrs for planning IMRT (inverse planning system) and 2hrs for QA leading to a total preparation time of 7.5hrs±1hr dependent on physician contouring time. Conventional technique required 10.2hrs to plan a typical 3-phase plan (2.75hrs±1.25hrs per plan depending on complexity of plan) (3D planning system) including 1hr mould room time needed to construct shielding for electron posterior neck fields. Weekly orthogonal check films were taken for all patients. All patients required aquaplast-orfit mask for immobilization.
Conclusion: The results of this study show that the overall treatment time is slightly to moderately longer (1.0–4.5hours) with IMRT but with a significant decrease in treatment preparation time (30%) versus the conventional technique. Therefore, the impact of IMRT on the overall workload of the department is modest making it a reasonable option for treating head and neck cancer.

	IMRT (70Gy/33)	IMRT (60Gy/25)	Conventional (70Gy/35)
Total Plans	1	1	3
Contouring time* (average)	0.5–2.5 hrs (1.5 hrs)	0.5–2.5 hrs (1.5 hrs)	0.05–0.5 hrs (.275 hrs)
Planning Time* (average)	4 hrs	4 hrs	1.5–4 hrs/plan (2.75 hrs)
QA*	2 hr	2 hr	0
Mould Room Time*	0	0	1 hr
Average treatment preparation time	7.5 hrs	7.5 hrs	10.2 hrs
Average Daily treatment time	18 min	18 min	9 min
Average overall treatment time	11 hrs	7.5 hrs	6.5 hrs (including 10 posterior neck electron treatments)
Average overall workload time	18.5hrs	15 hrs	16.7hrs

1045 POSTER

Outcome and prognostic factors in olfactory neuroblastoma: a multicenter rare cancer network study

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Background: To define prognostic factors and patterns of failure in olfactory neuroblastoma.
Materials/Methods: Fifty-six patients treated for non-metastatic olfactory neuroblastoma in 13 European and American centers between 1971 and 2004 were included in this study. Median age was 50 years (range: 15–79), and male-to-female ratio was 29/27. Diagnostic work-up included CT-scan in 51 (91%), and MRI in 28 (50%) patients. According to Kadish classification, there were 7 (12%) stage A, 24 (43%) stage B, and 25 (45%) stage C patients. Forty-eight patients presented with N0 (86%) disease. Most ($n = 46$) benefited from surgery (S). Treatment consisted of a combination of S, radiation therapy (RT), and chemotherapy (CT) in 12 patients (21%), S+RT in 29 (52%), S alone in 5 (9%), RT+CT in 6 (11%), and RT alone in 4 (7%). Total excision was possible in 40/46 operated patients (28 R0, 12 R1, and 6 R2). All but 5 patients benefited from RT with a median dose of 60 Gy in median 2 Gy/fr (range: 1.6–2.5). RT was delivered using 2D-RT in 27 patients (48%), 3D-RT in 22 (39%), and intensity modulated RT (IMRT) in 2 (3%). PTV included the tumor bed in 44 (86%), and tumor bed and involved lymph nodes in 7 (14%) patients. Chemotherapy was given in 18 patients (32%). Median follow-up was 74 months (range: 7–314).
Results: Median time to locoregional progression was 27 months. Local progression was observed in 23 patients (41%), regional in 16 (29%), and distant metastases in 10 (18%). Causes of death included progression in 25, postoperative complications in 3, and intercurrent disease in 2 patients. The 5-year overall survival, disease-free survival (DFS), and locoregional control was 60%, 43%, and 53%; respectively. In univariate analyses, factors favorably influencing the DFS were T1-T3 disease vs.