patients tolerated only 1 cycle synchronous chemotherapy. IMRT allowed excellent target coverage and spared critical structures but did not meet dose constraints to cochlea or parotid gland, partly due to the high proportion of patients with bilateral cervical nodal disease.

8551 POSTER

Comparison of Acute Toxicities in Head and Neck Cancer Patients Receiving Radiation as Adjuvant Therapy With Surgery Versus Radiation With Concurrent Chemotherapy

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Background: Patients with locally advanced head and neck carcinoma have two options of combined modality treatment namely either surgery and postoperative radiotherapy [S-PORT] or concurrent chemoradiation [CRT]. During the last ten years, chemoradiation is considered a suitable curative approach with organ preservation. Yet, poor compliance and toxicity remain a deterrent to successful treatment completion. The intent of this study is to perform a cohort analysis of such patients at this regional centre.
Materials and Methods: 59 patients of locally advanced head and neck carcinoma were chosen for the study. Twenty nine of them had had surgery and postoperative radiotherapy while thirty had concurrent chemoradiation. All of them were monitored during the course of radiotherapy at weekly intervals. Toxicity grading was done using RTOG Acute Radiation Morbidity Scoring Criteria. Dermatitis, oral mucositis, pharyngitis, laryngitis and salivary gland toxicity were observed. Pearson Chi-Square test was used to compare different toxicities in S-PORT and CRT groups at both second and last week of radiotherapy course. Comparison was done between individual grades in both groups as well as between combined grades (low grade including grades1, 2 and high grade including grades 3, 4). A value of $p < 0.05$ is taken as statistically significant in our study.
Results: The median age was 50 years in S-PORT group and 55 years in CRT group. Site wise distribution of cancer in S-PORT and CRT groups were 1 and 14 patients in oropharynx, 19 and none in oral cavity, 3 and 6 in larynx and 2 and 6 in hypopharynx respectively. No difference was noted in the groups for all of the toxicities assessed [$p = 0.584$ for dermatitis, $p = 0.901$ for oral mucositis, $p = 0.349$ for pharyngitis, $p = 0.136$ for laryngitis, $p = 0.532$ for salivary gland toxicity].

Table 1. Distribution of toxicities in two treatment groups (all values are in number of patients)

Acute toxicities	RTOG Grades 1 & 2		RTOG Grades 3 & 4	
	S-PORT (n = 29)	CRT (n = 30)	S-PORT (n = 29)	CRT (n = 30)
Dermatitis	25	25	3	4
Oral mucositis	23	25	4	3
Pharyngitis	15	17	9	11
Laryngitis	17	24	3	2
Salivary gland toxicity	26	28	0	0

Conclusions: The toxicities due to radiotherapy are comparable in patients of locally advanced head and neck carcinoma receiving either surgery with adjuvant radiotherapy or concurrent chemoradiation. Comparison in individual primary cancer sub site needs to be done to know the potential difference in treatment tolerance in both these treatment groups.

8552 POSTER

Phase 2 Trial of Total Mucosal and Bilateral Neck Intensity Modulated Radiotherapy in Squamous Cell Cancer of Unknown Primary

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Background: Squamous cell carcinoma of unknown primary (SCCUP) metastatic to cervical lymph nodes (LNs) constitutes about 2% of all head and neck carcinomas. There is no consensus on a standard radiotherapy clinical target volume (CTV) (ipsilateral neck only vs bilateral neck and mucosal tube) or dose to the CTV (50−70 Gy). The aim of this study was to assess safety and feasibility of total mucosal and bilateral neck intensity modulated radiotherapy (TMI/BN-IMRT).
Methods: We performed a single arm phase 2 prospective trial (RMH CCR2823). All patients (pts) had imaging (PET-CT 9 pts, CT 10 pts), pan-endoscopy and tonsillectomy or biopsy to exclude an occult primary. Patients with stage T0, N1−3, M0 (AJCC TNM 2002) disease were treated using a 5- to 7-field IMRT technique. CTV1 was the ipsilateral level 1b-5 and retropharyngeal (RP) LN. CTV2 was the mucosa of nasopharynx, oropharynx, larynx, hypopharynx and contralateral cervical level 2 to 5 and RP LNs. Prescribed dose to PTV1 and PTV2 in 30 fractions were 60−65 Gy (depending on resection status R0−60 Gy, R1/R2−65 Gy) and 54 Gy, respectively. Five patients received 65 Gy to PTV1. No prophylactic enteric feeding tubes were inserted.
Results: Nineteen pts (10 male) with a median age of 53.7 years (range 43.5–66.6 years) were treated between July 2007 and May 2010. Histology was SCC (18 pts) and undifferentiated carcinoma nasopharyngeal type (1 pt). Twelve pts received chemoradiotherapy with concomitant platinum and 7 pts had RT alone. The median treatment time was 41 days (range 39−43 days). All pts received the prescribed dose with no clinically significant delays. The acute toxicity (CTCAE v2.0) rate for grade 3 and 4 oropharyngeal mucositis was 31.6% and 0%, respectively, and grade 3 and 4 pharyngeal dysphagia was 36.8% and 0%, respectively. A nasogastric tube was inserted in 6 of these 7 patients with a median tube dwell time of 30 days (range 22 to 170 days). At a median follow-up of 23.7 months (range 2.5−43 months) no primary head and neck cancers were seen. Two-year overall survival, loco-regional recurrence free survival and distant metastasis free survival rates were 72.7%, 84%, and 94.4%, respectively.
Conclusion: This trial shows that primary or adjuvant TMI/BN-IMRT delivering 60−65 Gy to ipsilateral neck LN and 54 Gy to TM/contralateral neck LN is feasible and well tolerated. No primary head and neck cancers developed and the grade 3 or 4 dysphagia rate was low compared to previously reported TMI-IMRT regimens.

8553 POSTER

The Risk of Fatal Aspiration Pneumonia in Patients Treated With Curative Radiotherapy for Head and Neck Cancer

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Background: Severe dysphagia leading to penetration of food to the larynx and manifest aspiration is a common side effect after radiotherapy (RT) for head and neck cancer[1]. The aim of this study was to investigate the incidence and mortality of aspiration pneumonia in head and neck cancer patients treated with curative RT.
Materials and Methods: Patients treated with curative radiotherapy for head and neck cancer in Aarhus from Jan. 1st 2006 to Dec. 31st 2008 were included. Data on patient, tumour and treatment characteristic were obtained from the DAHANCA database. Data on hospital admissions with infectious diseases, airway infections, pneumonia, other diseases in the airway and dysphagia were obtained from the National Patient Registry. Data from the National Registry of Causes of Death on all deaths and causes of death in the cohort were obtained and merged by the unique id number given to all Danish citizens at birth.
A total of 341 consecutive patients with cancer of larynx, pharynx and oral cavity were included; median age at 63.8 years and 76% were men. Most patients had Stage IV disease (55%). No patients received chemotherapy as a part of the curative treatment.
Results: In the first year after RT there were 68 hospital admissions in 46 (13%) patients. A total of 17 patients were diagnozed with dysphagia. One patient was diagnozed with aspiration pneumonia, 23 patients were diagnozed with pneumonia and 11 patients were diagnozed with other airway infections or unspecified symptoms like fever, respiratory failure etc. 40 patients (12%) died during the first year after RT, 1 from lung cancer, 1 from unknown causes, 1 with infection and 3 from other diseases unrelated to infection or pneumonia.
Of the 128 patients who died, 85 had died with uncontrolled head and neck cancer. The 43 deaths occurring in relapse-free patients were unrelated to aspiration and pneumonia in 30 cases (20 died from other cancers (primarily lung cancer); 6 from cardiac diseases;and 4 from haemorrhage). In 13 cases aspiration and/or aspiration pneumonia could not be ruled out as contributing cause of death: 6 pneumonia and 7 unexplained causes. Of these, 4 had dysphagia, 3 had PEG tubes and 2 had been diagnozed with pneumonia within the last months.
Conclusion: Up to one third of all deaths in relapse-free patients after radical RT may be associated with dysphagia-related aspiration and pneumonia.

8554 POSTER

Helical Tomotherapy as a Treatment for Tumours Involving or Close to Optical Structures − Single Institution Initial Experience

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Background: Intensity modulated (IMRT) and image guided radiotherapy (IGRT) possibly enable an adequate dose with good coverage in head and neck tumours, reducing the toxicity in the organs at risk (OAR). Helical tomotherapy (HT) provides an integrated IMRT-IGRT system.

Methods and Materials: Between September 2009 and march 2011, we treated 13 patients with sinonasal tumours and 7 with nasopharyngeal tumours through HT in our institution. 14 patients were males and 6 females, with a mean age of 55 (range 40−81).
Sinonasal tumour location was: 6 nasal cavity, 5 ethmoid cells, 1 maxillary sinus and 1 multiple location. Pathologically, there were 4 squamous cell, 3 adenoid cystic, 3 intestinal-type adenocarcinoma, 2 small cell neuroendocrine and 1 undifferentiated neuroendocrine large cell. 12 patients of them presented locally advanced disease (cT3−4) with nodal involvement in only 2 patients. Partial resection was performed in 10 prior to radiotherapy.
Nasopharyngeal tumours were UICC stage I in 1 case, stage II in 2 and stage III in 4. All of them were pathologically lymphoepithelial carcinoma.
11 patients received concomitant platinum-based chemotherapy and 2 concomitant cetuximab.
Results: For sinonasal tumours, the median prescribed dose was 64.8 Gy (range 56−70) reaching a coverage of 90%. Elective nodal irradiation has not been performed in any patient. The median maximum dose values in the OAR were: ipsilateral optic nerve 57.7 Gy (range 34.58−62); contralateral optic nerve 52.5 Gy (range 23.5–58.4); optic chiasm 49.4 Gy (range 21.3–56.2); ipsilateral lens 12.4 Gy (range 8.1–51.5); contralateral lens 12.4 Gy (range 7.93–20.3); brainstem 52.4 Gy (range 27.3–61.6), spinal cord 30.3 Gy (range 13.9–41.2) and 20% oral cavity received 45 Gy. Should be noticed that dose level admitted to ipsilateral optical structures has been over the known tolerance in order to achieve control dose in PTV when previous blindness.
For nasopharyngeal tumours the median prescribed dose was 69.6 Gy (range 68.5−70) reaching a coverage of 95% of the PTV. Elective nodal irradiation was performed in every patient, reaching a coverage of 96% of PTV by 55 Gy. The median maximum dose values in the OAR were: spinal cord 37.15 Gy (range 31.2–45.6); brainstem 56.41 Gy (range 41.13–64.2); ipsilateral and contralateral optic nerves: 50.8 Gy (range 41.5–55.7) and 50.7 Gy (range 34.2–54.2) respectively.
14 patients presented grade 2−3 acute mucositis and 2 patients presented grade 1 conjunctivitis. With a median follow up of 7 months: 6 patients presented complete response; 3, partial response; 5 stable disease; 1 patient died. No available follow up for 5 patients.
Conclusion: Helical tomotherapy provides an accurate and reasonably tolerated treatment for tumours that involve the optical structures or are close to them. Further experience and protracted follow up is needed in order to evaluate late neurological toxicity.

8555 POSTER

Radiotherapy for High-risk Thyroid Malignancies − Report of Acute Toxicities of a Phase I Sequential Cohort Dose-escalation IMRT Study

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Background: The primary objective of this Phase I sequential cohort study was to determine the feasibility of delivering modest acceleration and dose-escalated IMRT in locally advanced high-risk thyroid cancers. We report the incidence and prevalence of acute toxicities of 2 dose fractionation regimens.
Methods and Materials: Patients with high-risk locally advanced thyroid cancer (medullary, differentiated and Hurthle) who required post-operative radiotherapy (RT) were recruited. Dose level 1 (DL1) delivered 58.8 Gy/28 fractions (F) (daily) to the primary tumour bed and involved nodes and 50 Gy/28 F to the elective nodes. Dose level 2 (DL2) delivered 66.6 Gy/30 F (daily) to the primary tumour bed, 60 Gy/30 F to the involved nodes and 54 Gy/30 F to the elective nodes. Acute toxicities (NCI-CTCAE v.3.0) were collected weekly during radiotherapy and weeks 1−4 and week 8 after RT. Late toxicities (RTOG and LENTSOMA) were recorded at 3, 6, 12, 18, 24 months and yearly to 5 years. Each DL recruited 15 patients with expansion of the cohort to 30 patients if one patient experienced high grade (G) ($\geqslant$G3) at 1 year. Dose limiting toxicity was defined as >2/30 patients experiencing $\geqslant$G3 at 1 year.
Results: Between 02/2002 and 12/2010, 15 patients were enrolled to DL1 and 30 patients to DL2. Indications for RT were: locally advanced disease with positive resection margins and/or extensive nodal disease. Incidences of G2 and G3 toxicities in DL1 were: dermatitis (29%, 36%), dysphagia (64%, 29%), fatigue (50%, 7%), mucositis (50%, 29%), pain (43%, 21%) and xerostomia (23%, 8%). For DL2, incidences of G2 and G3 toxicities were: dermatitis (52%, 21%), dysphagia (62%, 17%), fatigue (38%, 0%), mucositis (45%, 10%), pain (55%, 14%) and xerostomia (55%, 10%). All patients completed RT without treatment breaks. Peak prevalence of G3 dysphagia was at 6 weeks post IMRT for DL1 (29%) recovering to 0% at 8 weeks post-RT and at 1 week post RT for DL2 (17%) recovering to 5% at 8 weeks post-RT.
Conclusions: Modest acceleration and dose-escalation is safe and feasible. The incidence and prevalence of acute toxicities are similar in both cohorts. Longer follow-up is required to determine if dose-escalation continues to be safe at 1 year post-RT and whether there is any impact on local control.

8556 POSTER

Laryngeal Carcinoma in Young Adults Under Forty Years Old

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Background: Larynx cancer represents 5% of all the male cancers and 25% of the upper digestive airways. These cancers are mainly noticed men (95% of the cases), from 45 years to 70 years old. They are rare before the age of 40 (5%). Laryngeal cancer often occurs in alcoholic-smoking patients leading to a late diagnosis problem.
Material and Methods: This is a retrospective study involving a series of larynx cancer in the subject under 40 years old over a period of 10 years. We report the findings of our experience as well as a review of literature. The overall survival was calculated according to Kaplan–Meier method.
Results: During this period, 880 patients were treated for larynx cancer. Among them, 23 patients were under the age of 40 years, but only 13 patients were evaluable. The mean age of our patients was 35 years with extremes of 25 to 40 years. 69.5% of the patients were smokers. Dysphony was the most frequent motive behind consultation. It was noticed in 19 patients (82.6%). The affection of three floors of the larynx has been reported in 15 patients.
The extra laryngeal extension was noticed in 10 patients. Nine patients underwent whole laryngectomy combined to lymph dissection; 4 of them bilateral and 4 were homolateral, one patient underwent saving laryngectomy without lymph dissection.
Among the 8 nodes samplings, 3 were metastatic with capsular rupture. The chemotherapy–radiotherapy association with curative aim was used in 9 patients.
8 patients are in complete remission. 4 patients had therapeutic failure and one is lost to follow-up.
Conclusion: Larynx epidermoïd carcinoma, despite its rareness has to be evoked whenever there is a chronic dysphony in the young subject even in the absence of risk-factors. This allows diagnosis and precocious treatment. The biologic behaviour of the larynx epidermoid carcinomas in young adult patients does not seem to be worse than larynx cancers of comparable size in older patients. The treatment must lead to a compromise between the aggressive character of larynx epidermoid carcinomas and the importance of the psychological impact of the functional sequels caused by radical surgical treatment.

8557 POSTER

The Characteristics of Tumour and Involved Lymph Nodes in Human Papilloma Virus (HPV) Related Oropharyngeal Carcinoma Determined by Gross Tumour Volumes (GTV) Defined for Radiotherapy Planning

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Background: HPV-related [HPV(+)] oropharyngeal carcinoma (OPC) has well described differences in epidemiology and prognosis compared to HPV-unrelated [HPV(−)] OPC. The differences in the distribution of gross disease are less well described. This study compared the characteristics and distribution of primary tumour and involved lymph nodes (LNs) between HPV(+) and HPV (−) OPCs based on gross tumour volumes (GTVs) defined for radiotherapy (RT) planning.
Methods and Materials: All OPC patients treated with IMRT from 2005–2009 were included. HPV status was ascertained by p16 staining. GTV of primary tumour (GTV-T) and LN (GTV-N) were delineated on planning CT for treatment by Radiation Oncologists blinded to HPV status. GTV-N was defined as a nodal GTV designated to receive full RT dose. Clinical and radiological features (location, dimensions, number and volume) were determined for GTV-T and GTV-N and compared between HPV(+) and HPV(−) OPCs.
Results: HPV status was evaluated in 230/499 (46%) OPC cases, revealing 180 (78%) HPV(+) and 50 (22%) HPV(−). HPV(+) OPC arose almost exclusively in tonsil or base of tongue compared to HPV(−) (96% vs. 66%, $p < 0.01$), for whom 34% arose in soft palate, or pharyngeal walls. HPV(+) OPC was less likely to be T4 (16% vs. 30%, $p = 0.03$) with smaller GTV-T (81% <6 cm vs. 70%, $p = 0.03$) and (70% $\leqslant$30 cc vs. 54%, $p = 0.03$). A GTV-N was defined in 90% of HPV(+) cases in contrast to 76% of HPV(−) cases ($p = 0.01$). The largest GTV-N was larger for HPV(+) cases (82%