mucositis in oral/oropharyngeal carcinoma

A comparison of CTCAE version 3 and 4 in assessing oral mucositis in oral/oropharyngeal carcinoma

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Purpose or Objective: CTCAE version 3 is an observation based grading system for oral mucositis whereas version 4 is based on function and intervention. Although version 4 has been widely adopted in clinical trials there is limited data on its correlation with version 3 from which considerable radiobiological data has been derived. The purpose of this study was to assess the frequency of discrepancy between these two grading systems.

Material and Methods: Oral mucosal reactions of patients undergoing chemoradiation or radiation alone for oral or oropharyngeal cancer were graded by three radiation oncologists in weekly on treatment and post treatment clinics. CTCAE version 3 and 4 mucositis grading and patient factors were recorded prospectively. Differences in the rate of discrepancy were compared by time since the commencement of radiotherapy, synchronous agent and patient age.

Results: 485 measurements were recorded for 64 patients. Grading from version 3 and version 4 were equal in 270 (56 %) measurements. In the 215 (44%) measurements where version 3 and version 4 were not equal, discrepancies were seen in: grade 2 (N=230), grade 3 (N=3), grade 4 (N=22). The most typical patient was treated for NSCLC at 60-66Gy normo-fractionated with concurrent chemotherapy. Acute esophagitis (CTC grade 1 or higher) was observed in 110/131 (84%) and patient-reported SP in 99/131 (76%). Pain medication prior to RT was marginally protective against SP but was not statistically significant in single-parameter analysis (OR 0.58, 95%CI 0.24-1.41, p=0.21). A strongly significant dose-volume response exists between SP and radiobiologically-adjusted dose to the hottest 1cc of the esophagus. Predictive models of SP with repeated cross-validation accuracy of 78-84% were developed (sensitivity 88- 99%, specificity 48-75%). Trained machine learning models correctly predicted SP 76-84% of the time in an unseen validation cohort of 25 patients (sensitivity 94-100%, specificity 25-62%).

Conclusion: An integrative nursing care approach in the RT clinical workflow has been used to monitor symptoms and intervene for treatment-related pain. The risk of one particular patient-centred symptom, SP, can be sensitively predicted with nursing and treatment planning variables. A future nurse-led interventional study is planned, using predictive modelling for swallow pain, to examine the possible effects of pre-treatment pain-medications or corticosteroids on reducing dependence on additional pain medication.

OC-0274
Analysis of set-up errors in head and neck cancer treated with IMRT technique assessed by CBCT

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Purpose or Objective: The aim of this study was to investigate systemic set-up errors in head and neck (H&N) cancer treated with intensity modulated radiation therapy (IMRT) by kilovoltage (kV) cone-beam computed tomography (CBCT) evaluation.

Material and Methods: Between September 2014 and August 2015, 360 CBCT in 60 patients (pts) affected by histological confirmed H&N cancer treated with IMRT technique were analyzed. The majority of patients treated 45 (75 %) were male and only 15 (25%) were female; median age was 68 years (range 44-88 years). The type of head and neck cancer treated were, oropharynx, hypopharynx, nasopharynx, larynx, tonsil, oral cavity and parotid cancer. All patients underwent planning Computerized Tomography (CT) simulation on supine position on a GE LightSpeed RT 16 CT Simulator for 2.3 mm slice thicknesses. As immobilization system we utilized a head-shoulder thermoplastic mask (Easy Frame (Candor TM)). The CT data sets were transferred to the Focal and Varian Eclipse treatment planning system through DICOM network. The target delineation was contoured by one Radiation Oncologist and according to (ICRU62) the PTVs volumes were generated by adding a 3-mm margin in all directions to the respective CTVs. The prescribed dose was 66 Gy in 30 fractions delivered to GTVs, 54-63 Gy in 30 fractions to CTVs. The IMRT plans were created on the Varian Eclipse treatment planning system

led efforts to reduce the impact of SP on patient comfort, overall QoL and clinical workflow.

Material and Methods: An electronic journal audit was performed for patients commencing curative RT for lung cancer between January 2013 and March 2015. All NSCLC and SCLC patients were included, as well as various dose/fractionation, chemotherapy and medication schedules. Exported treatment plan DVHs were merged with nursing data. The highest score following weekly assessments of AE during radiotherapy was recorded, as was the appearance of SP and the time point at which it was mentioned. Predictive models of SP were developed using multivariable regression and machine learning algorithms.

Results: The most typical patient was treated for NSCLC at 60-66Gy normo-fractionated with concurrent chemotherapy. Acute esophagitis (CTC grade 1 or higher) was observed in 110/131 (84%) and patient-reported SP in 99/131 (76%). Pain medication prior to RT was marginally protective against SP but was not statistically significant in single-parameter analysis (OR 0.58, 95%CI 0.24-1.41, p=0.21). A strongly significant dose-volume response exists between SP and radiobiologically-adjusted dose to the hottest 1cc of the esophagus. Predictive models of SP with repeated cross-validation accuracy of 78-84% were developed (sensitivity 88-99%, specificity 48-75%). Trained machine learning models correctly predicted SP 76-84% of the time in an unseen validation cohort of 25 patients (sensitivity 94-100%, specificity 25-62%).

Conclusion: An integrative nursing care approach in the RT clinical workflow has been used to monitor symptoms and intervene for treatment-related pain. The risk of one particular patient-centred symptom, SP, can be sensitively predicted with nursing and treatment planning variables. A future nurse-led interventional study is planned, using predictive modelling for swallow pain, to examine the possible effects of pre-treatment pain-medications or corticosteroids on reducing dependence on additional pain medication.
using coplanar beams with 6 MV photons and the treatment was performed with DHX LINAC, VARIAN System. Pretreatment KV CBCT images were obtained at 1, 2 and 3 day of irradiations set-up corrections were made before treatment if the translational setup error was greater than 3 mm in any direction. Subsequently a weekly KV CBCT was repeated for whole duration of treatment.

**Results:** A total of 360 CBCT scans were acquired and analyzed. The systemic errors results 1.26 mm (SD ± 0.177) in RL direction, 1.25 mm (SD ± 0.187) in SI direction and 1.8 mm (SD ± 0.255) in AP direction. The range of deviations were 0-9 in RL directions, 0-5 mm in SI direction and 0-10 mm in AP direction. The frequencies of setup errors > 3 mm in RL direction was 3.9 %, in SI 8 % and AP directions 15.5 %, respectively. Analyzing the CBCT before set-up corrections the frequencies of set-up error > 3 mm were 17.8 %, 10.6 % and 5.6 % in AP, SI and RL respectively. After set-up errors corrections (corrections via couch shifts or patient repositioning) these rates were reduced to 13.3%, 7.2 and 2.2 % in PA, SI and RL direction, respectively.

**Conclusion:** The results of our study confirmed that image guidance with KV CBCT represents an effective tool for measuring set-up accuracy in the treatment of H&B cancer patients. This study suggested that KV CBCT once a week is adequate to overcome the problem of set-up errors in head and neck cancer treated with IMRT technique.

**Poster Viewing: 6: Clinical: Lung, palliation, sarcoma, haematology**

**PV-0275**

**IMRT for non-small cell lung cancer: a decade of experience at the Ghent University Hospital.**


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**Purpose or Objective:** In 1998, our institute developed a class-solution for intensity-modulated radiotherapy (IMRT) for lung cancer. Clinical implementation of IMRT gradually started as of 2002. This retrospective study reports on toxicity and overall survival (OS) of non-small cell lung cancer (NSCLC) patients treated with curative intent using the described IMRT set-up.

**Material and Methods:** Between 2002 and 2013, a total of 434 patients with a thoracic malignancy have been treated with IMRT in the Radiation Oncology department of the Ghent University Hospital. Those with NSCLC and receiving a total dose of ≥60Gy with fraction size <3Gy, a total 223, were retrospectively reviewed and formed the basis of this analysis. Clinical endpoints of OS and acute and late pulmonary and esophageal toxicity grade ≥3 were analyzed in relation to chemotherapy (concomitant vs. sequential chemoradiotherapy (CRT) vs. no chemotherapy) and use of standardized dose-volume evaluation criteria. Analysis was performed in SPSS using Kaplan-Meier curves for survival and Chi-square analysis for toxicity.

**Results:** Median follow-up time is 18 months (range 2-125). The table reports patient, tumor and treatment characteristics. OS was scored for all patients as date of death (N=140) or, if missing, as date of last consultation in our hospital (N=83). Acute and late toxicity data were available for 219 and 95 patients respectively. Median OS for the entire population was 25 months, 5 year OS 24%. OS was significantly better for patients treated with concomitant CRT than for those undergoing the sequential approach (median OS 30 months vs. 23; 5 years OS 32% vs. 12%) (p<0.05). Acute grade ≥3 pulmonary toxicity occurred in 7.8% of the patients, without significant difference between concurrent and sequential CRT. Acute grade3 esophageal toxicity occurred in 5.5% of patients overall; and was significantly worse (p<0.01) in patients treated with concomitant CRT compared to sequential CRT: 10.4% vs. 4.3% respectively. Late grade ≥3 pulmonary and esophageal toxicity was observed in 3.3% and 0% respectively; late grade ≥3 toxicity in 13.2% and 1.4% of the cases respectively. Although there was a trend towards reduced esophageal toxicity, the use of standardized dose-volume evaluation criteria (N=38) did not influence pulmonary (p=0.60) nor esophageal (p=0.08) toxicity significantly.

**Conclusion:** In spite of the low 5-year OS in patients undergoing sequential CRT, the entire NSCLC population treated with IMRT in our institution obtained OS in line with that reported in the literature. IMRT further confirms the potential for reduced toxicity as observed in other single-center experiences. Regardless of the lack of documented significant impact, we are convinced that the use of standardized dose-volume evaluation criteria has contributed to this positive outcome and is a precondition to exploit the full potential of IMRT in NSCLC.

**PV-0276**

**Adaptive radiotherapy: rate of “marginal” failure after “replanning” in combined treatment of NSCLC.**


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**Purpose or Objective:** Respiratory movement and anatomical changes of the lesion during radiotherapy are the main causes of target missing and/or irradiation of healthy lung tissue. The organ motion control and the correct identification of target volume (TV) contribute to manage these issues; however, the open question is if the adaptation of TV during treatment leads to an increased incidence of recurrences in the area of target reduction. The aim of this study is to evaluate patients’ pattern of failure distinguishing “marginal”, in field and out of field recurrences.

**Material and Methods:** In this prospective study, since 2010, locally advanced NSCLC patients treated with radiochemotherapy (RCT) underwent a weekly chest-CT simulation during therapy. In case of tumor’s shrinkage, a new TV was delineated and then a new treatment plan was sent to follow-up. The patterns of failure were sent to follow-up. The patterns of failure were classified as: in field (persistance or recurrence in TV post-replanning), “marginal” (recurrence in the area of initial TV excluded from the post-replanning TV) and out of field (recurrence outside of initial TV). We also evaluated distant failure.