EVALUATION OF THE RATIONALE FOR LINGUAL TONSILLECTOMY IN THE DIAGNOSTIC WORK-UP OF HEAD AND NECK SQUMOUS CELL CARCINOMA OF UNKNOWN PRIMARY: IMPACT OF IDENTIFYING SMALL TONGUE BASE PRIMARY TUMOURS ON IMRT CHARACTERISTICS AND CLINICAL OUTCOMES

Ali Hosni, Peter Dixon, Anupam Rishi, Michael Au, Wei Xu, David Goldstein, Shao Hui Huang, Brian O’Sullivan, John Waldron, John R. de Almeida, Scott V. Bratman
University of Toronto, Toronto, ON

Purpose: Transoral robotic surgery (TORS) and laser microsurgery (TLM) have been utilized to perform lingual tonsillectomy in the diagnostic work-up of head and neck squamous cell carcinoma of unknown primary (CUP). We evaluated the potential therapeutic value for this approach by comparing differences in radiotherapy characteristics and clinical outcomes for CUP and small base-of-tongue (BOT) tumours.

Methods and Materials: Retrospective review of BOT (T1N1-3M0) and CUP (T0N1-3M0) patients treated with intensity-modulated radiotherapy (IMRT) at our institution between 2005-2013 with known p16 immunohistochemistry status. The IMRT characteristics, mucosal (CTV-T) and nodal (CTV-N) clinical target volumes, and organ at risk (OAR) dosimetry, were obtained. Local (LC), regional (RC), distant control (DC), cause-specific (CSS), overall survival (OS) and RTOG Grade ≥ 3 late toxicity (LT) were analyzed.

Results: Fifty-four BOT (93% p16-positive) and 61 CUP (62% p16-positive) patients were identified. Respective N classifications included: N1 (15 versus 8%), N2a (17 versus 31%), N2b (28 versus 36%), N2c (24 versus 8%) and N3 (17 versus 16%). High-dose CTV-T was prescribed in 100% of BOT and 38% of CUP patients (p < 0.001). Low-dose CTV-T included mucosal sites outside of the oropharynx (i.e., nasopharynx, hypopharynx, and/or larynx) in 0% of BOT and 26% of CUP patients (p < 0.001), with greater volume of low-dose CTV-T in CUP than BOT patients (113 ± 8 versus 84 ± 6 cm³, p = 0.001). Bilateral neck irradiation was used in 53/54 (98%) BOT and 46/61 (75%) CUP patients (p < 0.001). OAR dosimetry demonstrated that BOT patients received higher maximum dose (Dmax) to the mandible (71 +/- 4.5 versus 67.2 +/- 6.7 Gy, p = 0.001), with a trend toward higher laryngeal Dmax (66.1 +/- 7.6 versus 62.8 +/- 9.3 Gy, p = 0.059) and lower average dose (Dmean) to the larynx (43.8 +/- 7.5 versus 47.1 +/- 10.0 Gy, p = 0.059). There were no significant differences in Dmax to inferior constrictor muscle or esophagus, and Dmean to mandible, inferior constrictor muscle or esophagus (p > 0.05 for all). The three-year LC, RC, DC, CSS and OS for p16-positive BOT versus CUP patients were 100% versus 95%, 98% versus 100%, 94% versus 91%, 94% versus 93%, 88% versus 91%, respectively, while in p16-negative BOT versus CUP patients were 75% versus 100%, 75% versus 82%, 100% versus 85%, 75% versus 85%, 50% versus 74%, respectively (p > 0.05 for all). Grade 3 LT recorded in two (3%) CUP patients (neck fibrosis) and five (9%) BOT patients (two neck fibrosis, two osteoradionecrosis, and one dysphagia).

Conclusions: Patients treated with IMRT for CUP or small BOT tumours had similar clinical outcomes. Performing TORS or TLM to identify small BOT tumours would lead to a reduction in the volume of low-dose CTV-T, with more frequent use of high-dose CTV-T and bilateral neck irradiation. Future studies are required to investigate the potential impact of these volumetric and dosimetric differences on quality-of-life and functional outcomes.

149 INFORMATION NEEDS OF PATIENTS DIAGNOSED WITH HEAD AND NECK CANCER UNDERGOING RADIATION THERAPY: A SURVEY OF PATIENT SATISFACTION

Cecilia Kim, Ruth Dillon, Luminita Nica, Mira Keyes, Eric Berthelet
British Columbia Cancer Agency, Vancouver Centre, Vancouver, BC

Purpose: A comprehensive revised patient education booklet, for patients diagnosed with head and neck cancer, was developed at our centre. This revised education booklet consolidates information from various sources in a single document. The objectives of this study are: 1) to identify patients' reported informational needs and areas for improvement in patient education; and 2) to evaluate the level of patient satisfaction with the written information they received.

Methods and Materials: A sample of 100 patients will be surveyed. The first cohort of patients will receive the original education material. The second cohort of patients will receive the education material revised. The survey will be administered to both cohorts of patients at two points during their treatment pathway: at the preliminary radiation treatment appointment and at the six week follow up appointment. A satisfaction survey has been derived from the standard patient satisfaction survey currently in use at our institution. Survey's questions evaluate several measures including content, amount, ease of understanding and timing of information delivery.

Results: Data collection is currently ongoing. Qualitative responses will be reviewed and categorized using thematic analysis. Data from the two patient cohorts will be compared. Descriptive statistics will be used for quantitative analysis. Independent t-test will be used to test for differences between the two cohorts of patients. A rank-sum test will be used to determine whether the two groups of respondents differ in their average response. Within each cohort, a dependent t-test will be used to test for differences between the two time points at which the data is collected.

Conclusions: The information gathered will be used to assess the usefulness of the new educational booklet compared to previous material. This may help develop site specific educational materials to improve our current practice and patient satisfaction.

150 DECISIONS, DECISIONS - PATIENT CENTRED DECISION AID FOR OROPHARYNGEAL CANCER TREATMENT

Grace Scott, Jacqueline Lam, David Palma, Kevin Fung, Alexander Louie
University of Western Ontario, London, ON

Purpose: Definitive radiotherapy (RT) with or without chemotherapy has been the standard of care for early oropharyngeal cancer, achieving excellent oncologic outcomes but often with significant toxicities. Trans-Oral Robotic Surgery (TORS), a minimally invasive surgical approach, has emerged as a promising alternative with initial reports suggesting comparable oncological outcomes and excellent functional outcomes. Current studies are being performed to compare these two modalities in a head-to-head fashion; however, patient preferences regarding the choice of RT versus TORS are unknown. A Decision Aid was developed to navigate newly-diagnosed patients through the complex process of deciding between the two treatment modalities to best suit their individual circumstances.

Methods and Materials: A Decision Aid was developed on an interactive multimedia web platform to enable ease of access in multiple settings. The Aid provides a visual description of the treatment modalities, including their respective timelines, and photographs of treatment-related equipment. Detailing of the potential benefits and side effects of each treatment was included, with their relative frequencies. Healthy adult volunteers (age 18-80) were recruited to pilot test the online module and confirm psychometric properties. Following a verbal description of a hypothetical diagnosis of early oropharyngeal cancer, subjects were guided through the Decision Aid with a trained researcher. Subjects were then asked to make a preferred treatment based on the assumption of equal oncological outcomes. Once established, the survival rate of the alternate therapy was increased to establish a treatment tradeoff point, in which the preferred strategy would switch.
Information regarding the most pertinent side effects were collected, as well as the perceived utility of the aid.

**Results:** Thirty-two participants (16 men, 16 women) with a median age of 34.5 (range 18-64) enrolled in this study. Twenty-six subjects (81%) selected TORS as their preferred treatment option. Tradeoff revealed that participants were willing to accept a median score of 10% (range 5-50) decrease in survival to maintain their treatment choice. Regarding side effect profiles, the most concerning risks of TORS were: bleeding, death, stroke and aspiration pneumonia. Whereas, the most concerning toxicities of RT were: tooth decay, need of a feeding tube, and the risk of secondary malignancy. Finally, all subjects indicated that if they would value having a similar tool available per chance they are in a similar situation.

**Conclusions:** A novel web-based Decision Aid has been developed for patients with early oropharyngeal cancer. The finding that TORS was preferred over RT in a sample of healthy volunteers necessitates confirmation in a cohort of patients with early oropharyngeal cancer. This tool holds promise in the era of shared-decision making and personalized patient-centred care.

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**Does Mid-Treatment CBCT-Guided Patient Repositioning During Lung VMAT Impact Target Coverage?**

**Dominique Mathieu, Marie-Pierre Campeau, Robert Doucet, Karim Zerouali, Stéphane Bedwani, Houda Bahig, Louise Lambert, Thi Trinh Thuc Vu, David Roberge, Édith Fillion Centre Hospitalier de l’Université de Montréal, Montréal, QC**

**Purpose:** The objectives of this study are to (1) quantify intrafraction motion (IFM) during lung volumetric-modulated arc therapy (VMAT) and (2) evaluate the impact of mid-treatment patient repositioning after cone beam computed tomography (CBCT) acquisition upon target coverage.

**Methods and Materials:** This analysis included lung tumours treated with VMAT between April 2012 and June 2015 with 50-60 Gy in 3-5 fractions. Treatment planning consisted of a four-dimensional (4D) CT scan from which an internal target volume (ITV) delineation was performed. A 5 mm margin was added in all directions to obtain the final planning target volume (PTV).

Treatment sessions were performed in supine position with a customized dual vacuum immobilization device (BodyFIX, Elekta, Stockholm, Sweden). All patients underwent pre and mid-treatment CBCTs to ensure proper repositioning. Following each CBCT, a two-step rigid registration was performed by an experienced radiation oncologist according to the planning CT, taking into account organs at risk (OARs). Bone shift was first assessed with a registration of the vertebrae adjacent to the lesion. Then, tumour shift was isolated with a soft tissue registration by aligning targets. IFM, combining bone and tumour shifts, was defined as the target displacement from pre to mid-treatment CBCT acquisition and was quantified in terms of anterior-posterior (AP), cranio-caudal (CC) and medio-lateral (ML) amplitudes as well as three-dimensional (3D) vector. For patients with IFM ≥ 5 mm, a post-hoc dose calculation analysis was performed to assess target coverage impacts of mid-treatment CBCT-guided repositioning.

**Results:** Ninety-seven patients, totaling 367 fractions, were included. Mean ±SD overall treatment time was 53:02 ± 13:08 min. Mean time from pre to mid-treatment CBCT scan acquisition, registrations and couch repositioning was 22:58 ± 5:33 min. Mean time to perform mid treatment CBCT scan acquisition, registrations and couch repositioning was 15:49 ± 4:14 min. Mean IFM amplitudes were 0.9 ± 1.2 mm, 0.6 ± 1.0 mm and 0.6 ± 0.8 mm in the AP, CC and ML respectively. IFM was < 3 mm and < 5 mm in all directions in respectively 315/367 (86%) and 358/367 (98%) fractions. Mean 3D IFM vector was 1.5 ± 1.4 mm (max = 8.1 mm) and was < 5 mm in 354/367 (96%). Among the 13 fractions with IFM vector ≥ 5 mm, 11/13 (85%) were dominantly induced by a tumour shift. For all these fractions, dose calculation analysis of worst-case scenario indicates that ITV coverage would have remained ≥ 95% without mid-treatment CBCT-guided patient repositioning.

**Conclusions:** For 96% of fractions in patients immobilized with a customized BodyFIX dual vacuum bag, the IFM vector was within the 5 mm PTV margin used. Mid-treatment CBCT-guided couch repositioning did not significantly impact ITV coverage and prolonged treatment duration. Mid-treatment imaging may remain pertinent for selected patients with strict OAR dose constraints.

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**Lack of Dose-Volume Parameter to Predict the Development of Chest Wall Pain After SBRT for Lung Cancer**

**Sergio Faria1, Issam El Naqa2, L Ming Wang3**

1McGill University Health Centre, Montreal, QC
2University of Michigan, Michigan, MI

**Purpose:** Chest wall (CW) pain is as a possible late toxicity after SBRT. Several dosimetric factors have been reported to predict it, however, with no clear validation. This article reports our institutional experience with CW pain and the search for dose constraints for the CW as organ at risk in a homogeneous group of patients treated with the same dose and fractionation, planned with heterogeneity correction, without any initial dose constraint to the CW at the initial planning.

**Material and Methods:** Patients with localized lung tumours, treated with SBRT the way mentioned above, to a dose of 48 Gy in 3 fractions, with the PTV touching the CW were reviewed. CW (2 cm expansion) was contoured retrospectively. Using Eclipse (Varian) software, common metrics of the absolute volume of the CW receiving ≥ 30 Gy or more (V30Gy), the intersecting volumes (in cm^3) between the PTV and CW volumes, the mean dose and the max dose of the CW volume were extracted. CW pain was graduated by Common Terminology Criteria for Adverse Events v3.0. Data analysis and data correlation was carried out using the widely used Dose Response Explorer System 1 (DREES) software, which allows for analytical and data-driven outcome modeling.

**Results:** Seventy-five lung lesions in 71 patients met the criteria for our study. After a median follow up of 16 months, five patients reported CW pain (3 Grade = 3 and 2 Grade = 2). Median time for CW pain to manifest was seven months. The median volume of CW receiving ≥ 30 Gy was 26 cc (range: 0.1 - 126 cc). The V30 Gy volumes (cm^3) of the five cases with CW pain were 15, 15, 20, 47 and 100. For all lesions, mean Dose to CW = 54.2 ± 2.3 Gy. Median max CW dose = 57 Gy. After DREES analysis, no correlation between the variables studied and CW pain was found.

**Conclusions:** CW pain is an important late toxicity after SBRT in lung tumours. V30 Gy of the CW has been often used to decrease the risk of CW pain, but the volume is not clear. None of the common variables (including V30 Gy) analyzed in this study was statistically significant for CW pain. Good dosimetric constraints to decrease risk of CW pain remain to be determined.

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**Do We Really Need Customized Immobilization Devices for Modern SBRT in Lung Cancer?**

**Sergio Faria, Iqbal Al Amri, Jessica Gluszek, Horacio Patrocinio McGill University Health Centre, Montreal, QC**

**Purpose:** To assess the intra-fraction tumour stability of lung cancer patients treated by cone beam computed tomography-guided (CBCT) stereotactic body radiotherapy (SBRT) without any frame or immobilization devices.

**Materials and Methods:** Localized lung cancer patients were treated with SBRT, positioned supine, with arms held above the head, a foam support under the knees and without any further immobilization. Internal target volume (ITV) was generated from 4D-CT simulation around which a 5 mm symmetric PTV margin was added. All patients (except one) received 48 Gy in 3