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Purpose: A 2011 survey on the practice of intensity-modulated radiotherapy (IMRT) in the treatment of vulvar carcinoma originally highlighted areas of controversy and subsequently lead to the establishment of consensus recommendations for contouring and treatment in vulvar carcinoma. The present study aims to outline changes in practice over the last five years.

Methods and Materials: Radiation oncologists with an expertise in gynaecological malignancies from a multi-national consortium (North America, Australia and Europe) were asked to complete a web based survey in 2011, then in 2016. Questions covered a wide range of issues in regards to staging, planning and IMRT treatment of vulvar cancer. Pearson's chi-squared test was used to compare the two surveys.

Results: Thirty-five radiation oncologists completed the survey in 2011, 24 in 2016. Half of the respondents were from the USA. An increase in the use of IMRT was reported. In 2011, 29% have never used IMRT in the management of vulvar cancer, compared to 4% in 2016, and 23% have treated more than 10 patients with IMRT in 2011, compared to 75% in 2016 ($p = 0.006$). PET-CT was used for staging by 69% of respondents in 2011 as compared to 88% in 2016 ($p = 0.09$). There was also an increase in the use of MRI for planning purposes ($p = 0.018$) and more physicians now report replanning during the course of treatment (74% versus 25%; $p = 0.001$). More respondents now use a higher total dose (≥ 66 Gy) to the primary lesion (55% versus 41%; $p = 0.312$) although it did not reach statistical significance. There remains controversy on the total dose to deliver to involved lymph nodes. Similarly, there remains considerable variation in clinical target volume (CTV) definitions for different clinical scenarios as well as dose constraints for organs at risk (OAR). There is a trend of an increasing bone marrow contouring by radiation oncologists (47% versus 29%; $p = 0.19$), but there is still considerable discrepancy in the pelvic bones selected to represent 'bone marrow'. Weekly cisplatin at 40 mg/m² remains the most commonly used concurrent chemotherapy regimen.

Conclusions: The use of IMRT for vulvar cancer has increased over the past five years. CTV definition and OAR dose constraints remain the biggest areas of controversy, highlighting the need for new consensus recommendations.

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A PRACTICAL METRIC TO GUIDE PATIENTS SELECTION FOR BREATH-HOLD RADIATION THERAPY (BH-RT) IN LEFT-SIDED BREAST CANCER

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Purpose: Patients with left-sided breast cancer receiving radiotherapy (RT) are at increased risk of cardiac toxicity. Anatomic features that predict which breast patients would benefit from BH-RT for cardiac-sparing have been proposed. The purpose of this study is to evaluate the performance of a new

metric in comparison to existing predictors in determining the need for BH-RT.

Methods and Materials: In this single institution study, 50 randomly selected left-breast cancer patients treated with BH-RT were evaluated. Free-breathing and breath-hold images are both acquired during planning and the former set were used in this analysis. Target volumes and organs at risk were contoured using RTOG and consensus-based atlases. Using a cut-off of > 10 cc V50% or mean heart dose (MHD) ≥ 1.7 Gy as selection criteria for BH-RT, a study by Lee et al. previously described the parasagittal heart contact with the chest wall length (HeartContact) as the most accurate predictor of benefiting from BH-RT use. We evaluated the performance of HeartContact versus two new candidate variables, measured as the lateral length between the left sternal edge to the beginning of lung parenchyma at the 1) fourth (Arch4) and 2) fifth costal arch (Arch5) levels. These three independent variables were compared with mean heart dose (MHD), V50% heart volume and left anterior descending coronary (LAD) max dose. Recursive partitioning analysis (RPA) was performed to define optimal cut-points for independent variables. Sensitivity and specificity were calculated based on these parameters. Univariable regression analysis was used to identify significant predictors of breath hold end points. Statistical analyses were performed using SAS (v.9.4) with two-sided statistical testing at the 0.05 significance level.

Results: The median patient age was 53 years and all underwent breast-conserving surgery. The MHD was 2.3 Gy (± 0.8) and mean V50% was 10.4 cc (± 9.7). RPA determined 73mm as the optimal cut-off for HeartContact, 13 mm for Arch4 and 60 mm for Arch5, respectively. When considering MHD ≥ 1.7 Gy to predict for BH-RT, HeartContact sensitivity and specificity were 77% and 90%; with Arch4 yielding 80% and 90%, respectively. In the case of V50% ≥ 10 cc to predict for BH-RT, HeartContact sensitivity and specificity were 87% and 55%; Arch4 yielded values of 100% and 63% respectively. Arch4 was more sensitive and specific in predicting BH-RT than Arch5. On univariable linear regression analysis, Heartcontact and Arch4 were found to be statistical significant predictors of MHD, V50% and LAD Max dose ($p < 0.05$). Receiver operating curves demonstrated that Arch4 was the most accurate predictor of high cardiac dose (MHD ≥ 1.7 Gy and V50% ≥ 10 mL).

Conclusions: Our proposed variable, Arch4 holds promise as a practical and accurate predictor of high heart dose and the need for BH-RT for left-sided breast cancer patients. An external validation study is planned to confirm the diagnostic performance of our novel variable.

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SERUM EXOSOMAL MICRORNAS (MIRNAS) AS NON-INVASIVE BIOMARKERS TO GUIDE POST-OPERATIVE RADIOTHERAPY IN PROSTATE CANCER (PCA) PATIENTS TREATED WITH RADICAL PROSTATECTOMY (RP)

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Purpose: Despite possessing similar clinicopathological features, some Pca patients treated with RP are at high-risk of developing local and/or distant recurrence and dying of their cancer, whereas many others will have clinically insignificant disease and will not benefit from post-operative radiotherapy. A minimally invasive diagnostic assay is required to stratify these patients, monitor disease progression and response to treatment, ultimately improving patient care. Extracellular miRNAs embedded in circulating exosomes have sparked much interest as potential non-invasive biomarkers for Pca.

Methods and Materials: Patients who had RP and were referred for post-operative radiotherapy were prospectively recruited and patient, tumour and treatment factors were abstracted and analyzed. Serum exosomes were isolated for extraction of miRNAs, and comparative profiling of miRNAs was performed