Purpose: Non-melanoma skin cancers occurring in areas with irregular contours like the ear pose challenges in effectively delivering a therapeutic radiation dose using electrons. As electrons deliver dose at a depth, a tissue equivalent material called bolus must be placed on the skin so that therapeutic dose is delivered to the tumour. Commercially available bolus forms include wax, but this also has shortcomings. It is labour intensive and lead to treatment inaccuracy. A custom bolus can be made from silicone, which conforms to irregular anatomy, using an optical scanner and 3D printing.

Methods and Materials: Volunteer specific anatomy of the ear was acquired using a consumer-grade optical scanner (3D Systems, Sense). A three-dimensional model of each volunteer was exported as an STL file to software controlling the printer (Repetier-Host), converted to gcode (Slic3r) and printed. Systems, Sense). A three-dimensional model of each volunteer was acquired using a consumer-grade optical scanner (3D Systems, Sense). A three-dimensional model of each volunteer was exported as an STL file to software controlling the printer (Repetier-Host), converted to gcode (Slic3r) and printed. The printer generated a silicone replica which was used to create a soft silicone conformal bolus.

Results: Preliminary data from the first eight patients enrolled are presented. Median age was 60 years (56-71) and median planned dose to the left breast was 42.56 Gy (42.56-50) in 16 fractions (16-20). For the left coronary artery, mean dose, V5 and V20 in systole versus diastole were 6.1 Gy versus 7.9 Gy (p = 0.02), 37% versus 45% (p = 0.02) and 10% versus 16% (p = 0.04), respectively. For the whole heart, mean dose, V5 and V20 in systole versus diastole were 0.9 Gy versus 1.3 Gy (p = 0.005), 21 cc versus 32 cc (p = 0.07) and 4 cc versus 5 cc (p = 0.1), respectively.

Conclusions: Beyond DIBH, systolic irradiation would be associated with further reduction in V5, V20 and mean dose to the left coronary artery, as well as a reduction in V5 and mean dose to the left ventricle and heart as a whole. The potential clinical impact of this reduction as well as the feasibility of cardiac gated irradiation are to be further investigated.

74 INNOVATIVE APPROACH FOR GENERATING SOFT SILICONE BOLUS USING 3D PRINTING FOR ELECTRON TREATMENT OF SKIN CANCERS IN AREAS WITH IRREGULAR CONTOURS

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Purpose: Silicone bolus accurately fits with no air gaps and is better for irregular contours than a commercial or wax bolus. It is also better than a hard plastic 3D printed bolus for areas where a rigid bolus is difficult to use or causes patient discomfort. This approach does not require intensive training and enhances the patient experience as they can have an optical scan on the day of clinical appointment and directly come on the day of treatment. It also has potential to save treatment machine time because the setup time is anticipated to be reduced as the complexity of set up is greatly decreased.

Results: Median follow up was 7.1 years (range: 2.5 - 12.5). Intervention for RTOG Grade 3 toxicity was encountered in 51 patients (7%). Cystoscopy, transurethral resection of the prostate (TURP) or prostate brachytherapy were used in 48 patients for RT related hematuria or obstruction. TURP was performed in 14 patients (1.9%) with a median time from implant of 20.4 months (range, 3-86) and dilatation for RT toxicity in six patients (0.8%) with a median time of 29 months (range, 20-85). Median pre-implant volume was 37.1 cc (20.2 - 53.0) in patients having intervention for Grade 3 toxicity and 33.7 cc (13.2 - 66.9) in those without (p < 0.05). Time from biopsy to implant, pre-treatment AUA symptom score, PSA, clinical stage, use of hormones, and urethral dosimetry did not predict for urinary intervention in our analysis.

Conclusions: Urinary intervention rates following intraoperatively planned LDR prostate brachytherapy are low overall at 7%. The strength of our study is the ability to review all hospital records in our health region to completely capture any urinary intervention due to an integrated electronic health records system.
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 contact 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.