(6.71±1.09%) was slightly worse than $VMAT_{Full}$ (5.37±1.33%) although could not be shown statistically significant (*p*=0.054). All techniques achieved similar CN. Treatment delivery times for HT (332.7±87.6s, $p<0.05$), $VMAT_{Full}$ (158.7±2.2s, $p<0.001$) and $VMAT_{Ltd}$ (136.0±10.2s, $p<0.001$) are significantly shorter than IMRT (416.2±31.2s).

Conclusions: Our results indicate that HT provides better sparing of spinal cord in treating thyroid cancers. No significant advantage of sparing larynx, oesophagus or oral cavity could be found in any of the treatment techniques. All treatment techniques have similar target homogeneity and conformity. Limiting the arc span from posterior neck in VMAT planning does not help in spinal cord sparing but scarifying target homogeneity slightly.

OC-0090

Clinical introduction of an all-in class solution for prone breast hypofractionated SIB with multibeam IMRT

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Purpose/Objective: To develop a robust treatment planning approach for hypofractionated simultaneously integrated boost (SIB) using multibeam IMRT for breast cancer patients in proneposition.

Materials and Methods: Eighteen patients were included this study (15 were planned and 3 treated with SIB) positioned on the Sagittilt© (Orfit, Wijnegem, BE) system for treatment. Classical (CLA) and SIB techniques were used for the treatment planning using Pinnacle 9.0 (Philips, Best, NL). Both approaches consisted of two tangential field-in-field beams for the treated breast (*PTV1*). For the boost (*PTV2*) two mini-tangents were used in CLA while for SIB two additional beams (35-40° and 70-90° degree gap from the internal and external tangents towards posterior direction) were defined. SIB was optimized using inverse DMPO taking into account the dose contribution of the initial breast tangents and limiting the total number of segments to 10. For adequate comparison both plans were normalized for 45.77 Gy and 55.86 Gy mean dose for *PTV1* and *PTV2* in 21 fractions (2.17 and 2.66 Gy/fr). Ipsilateral lung, heart, contralateral breast were contoured as OARs. The following DVH parameters were used for comparison: *V48.76Gy*(107% of breast prescription dose) for *PTV1*and *PTV1-2 (PTV1 excluding the PTV2 volume)*, *V53.06Gy* (95% of boost prescription) for *PTV1-2* and *PTV2*, and *V59.76Gy*for *PTV2* (107% of the boost prescription). For the ipsilateral lung *V20*, *V30*, for the heart *Dmean* , *D2*and for the contralateral breast *Dmean* and *D2* were compared using two tailed t-test with the significance level p<0.05.

Results: Our finding are summarized in Figure 1. The SIB technique showed statistically significantly improvement for *PTV1-2_48.76* (29.7vs. 37.7%), *PTV1-2_53.06* (7.1 vs.26.2%) and *PTV1_53.06* (39.1 vs.23.5%) with p*PTV2_53.06*: 99.4vs. 98%, p=0.1, *PTV2_59.76* 0 vs. 0%).For OARs the SIB resulted in a statistically significantly increase in lung *V20*(3.1 vs. 2.9%, p=0.03), heart *Dmean* (2.1 vs. 1.2 Gy) and heart *D2* (7.5 vs. 5.5 Gy, both P*Dmean*:0.6 vs. 0.6 Gy, contralateral breast *D2* 2.1 vs. 2.2 Gy, p=0.05).

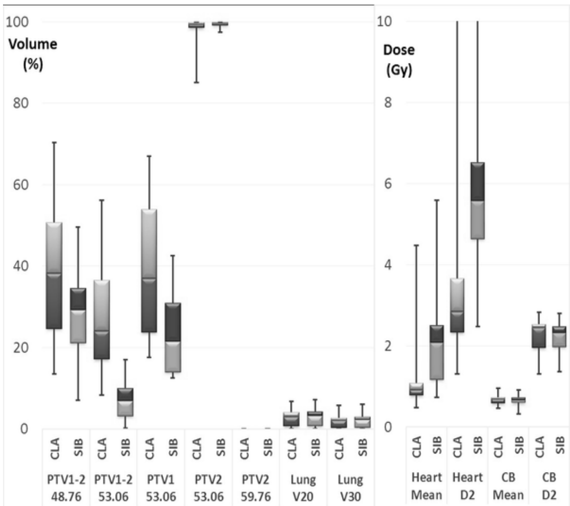

Figure 1.Comparison of classical (CLA) and SIB treatment planning for breast cancer patients with hypofractionated, multibeam IMRT in prone position.

Conclusions: A robust and effective treatment planning class solution for prone hypofractionated simultaneously integrated boost (SIB) has been developed and clinically implemented. The dramatically increased target conformity might overweight the small additional dose to OARs.

OC-0091

Dosimetric comparison of arc planning strategies for radiosurgery of brain arteriovenous malformations

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Purpose/Objective: Radiosurgery is an established treatment option for brain arteriovenous malformations (AVM). Particularly for this benign indication of radiation, it is of utmost importance to aim for an optimal conformity for the target volume and sparing of normal brain tissue from both high- and low dose irradiation. In an attempt to improve this, we have compared our current standard technique of dynamic conformal arcs (DCA) with an approach using volumetric modulated arc therapy (VMAT; RapidArc), both with coplanar (C-VMAT) arcs and non-coplanar arcs (NC-VMAT).

Materials and Methods: Radiosurgery treatments plans generated with DCA in 10 patients with AVMs formed the basis for comparison with C-VMAT and NC-VMAT plans. AVM volumes (GTV=PTV) ranged from 0.1 to 7.9 cm^3, with five AVMs located peripherally and five AVMs more centrally. Radiosurgery was delivered in a single fraction of 18-21 Gy prescribed at the encompassing 80% isodose. DCA plans using five non-coplanar partial arcs (120 degrees per arc distributed over the skull) were compared to C-VMAT plans consisting of two coplanar 360 degrees arcs and NC-VMAT plans using three non-coplanar partial arcs (239 degrees per arc along the ipsilateral side of the head). Treatment plans were calculated using the ACUROS XB algorithm. Dosimetric parameters were analyzed for the Dmax of PTV, number of monitor units (MU), Paddick conformity index (CI), Paddick gradient index(GI), gradient distance (GD) (distance from 80% isodose to 40% isodose equivalent spheres), the V_{12Gy} of normal brain and the $V_{3Gy}$of skin. Planning outcome parameters were compared using the paired samplet-test and Wilcoxon signed-rank test, with statistical significance considered at p< 0.05.

Results: The planning results are shown in the table. The number of MU needed to deliver the dose was a factor 1.9 higher for both VMAT techniques compared to DCA. The use of VMAT techniques significantly improved the conformity of plans with a CI (Paddick) of 0.55, 0.85 and 0.83 for DCA, C-VMAT and NC-VMAT, respectively (p<0.01). In contrast, the GI (Paddick) was smallest for DCA delivery (p<0.01). The GD was only slightly lower for DCA compared to VMAT plans (p<0.01). Of potential clinical importance, both VMAT techniques decreased the V_{12Gy} from 7.7 cm^3 (for DCA) to 5.6 $cm^3$and 5.4 cm^3 for C-VMAT and NC-VMAT, respectively (p<0.01). The V_{3Gy} for the skin was not significantly different for the three studied techniques in the five patients with peripheral AVMs (p>0.05).

Mean values	DCA	C-VMAT	NC-VMAT
Monitor units	3829	7275	7218
CI (Paddick)	0.55	0.85	0.83
GI (Paddick)	3.8	5.2	5.0
GD (cm)	0.46	0.52	0.48
Dmax PTV (Gy)	27.0	28.1	27.8
V_{12Gy} brain (cc)	7.7	5.6	5.4
V_{3Gy} skin (cc)	2.0	3.0	2.4

Conclusions: Both C-VMAT and NC-VMAT resulted in improved target conformity and a decrease in the normal brain dose compared to DCA plans, at the cost of a higher number of MU and more shallow dose gradients. At the time of the meeting, proton treatment plans will be included and compared with the above rotational techniques.

POSTER DISCUSSION: 2: PHYSICS: IMPLEMENTATION OF NEW TECHNOLOGY AND METHODS

PD-0092

Comparison of dose delivery accuracy in two Leaf motion calculator algorithms in DMLC IMRT

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