Material and Methods: 25 Patients were included, with regional nodes level I-IV. Twelve were left-sided with breath-hold treatments. All were planned with both original 3DCRT and a new hybrid 3DCRT-IMRT techniques. Delineations were made according to ESTRO guidelines. Comparison was based on DVH parameters for OARs, namely lung, heart, oesophagus, contra-breast (eg V20, Dmean) and the PTV (V95%, D2%, D98%, conformity). Analysis was performed using SPSS. Further analysis focused on the efficacy for breath-hold treatments and efficiency in planning and delivery.

Results: The hybrid plan required extra structures to help avoid hotspots, which is especially important for heart-sparing breath-hold treatments. In general, hybrid plans were superior to 3DCRT plans. An exception was the slightly higher, but acceptable, average dose to selected OAR. Resulting clinical recommendations are as follows: for level I/II, where the delineation of lymph nodes in the cranial direction are limited to lateral side, an optimal plan may be created from 2-3 3DCRT open fields and 2-4 IMRT fields. For level I-IV (also with parasternal lymph node involvement), plan as for level I/II above, with an abutment involving no more than 2 fields. Previously 3DCRT treatments required 10-12 fields, hybrid plans require at most 7 fields (each 3 segments) and only half of the MUs.

Conclusion: Hybrid 3DCRT-IMRT plans are a major improvement on the current 3DCRT technique, with fewer hotspots and more control over the dose to OARs and the target. Planning objectives were achieved, with fewer fields, MUs and field abutments, without the need for wedges. In addition, the treatment length has been reduced, making this hybrid technique more suitable for breath-hold delivery.

PO-1007
Optimizing the overlap sector for patients undergoing cranio-spatial irradiation by VMAT
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Purpose or Objective: Volumetric modulated arc therapy (VMAT) techniques for cranio-spatial irradiation (CSI) allows radiation delivery without any field junction. Junctions are replaced by sectors in which arcs of two consecutive isocenters overlap. The dose contribution from each arc in this sector is automatically accounted for by the treatment planning system, with fewer hotspots and more control over the dose to OARs and the target. Planning objectives were achieved, with fewer fields, MUs and field abutments, without the need for wedges. The purpose of this analysis is to find an optimal length of overlap between the overlapping arcs to minimize the dose deviations that can be attributed to patient setup inaccuracies.

Material and Methods: Five (n = 5) patients undergoing CSI were planned using the Monaco 5.1 (Elekta Ltd,Crawley, UK) treatment planning system. Each plan consisted of 2 isocenters, with an overlap sector at the mid-cervical level. For the head a full clockwise-counterclockwise (cw-ccw) arc was used, while for the spine two cw-ccw partial arcs (180-260° and 100-181°) in order to assess the overlap length, plans were generated for overlap sectors of 2, 4, 6, 8 and 10 cm. Afterwards, plans were recalculated without re-optimization for a superior isocenter shift of +0.5 cm in crano-caudal direction and a -0.5 cm in the left-right direction, mimicking a potential patient setup error. Dose distributions of the generated plans with isocenter shift were compared to the original plans based on V90%, V95%, V110% of the Planning Target Volume (PTV) and Conformity Index (CI). Results: The introduction of a shift in the superior isocenter causes a 3% decrease in the V90% of PTV independently of the overlap length (Table1).

Results: A decrease in PTV coverage (V95%) is also observed and the effect is larger for the 10 cm overlap length. The volume receiving ≥110% of the prescribed dose increases when the length of the overlap becomes larger than 4 cm. The relative difference of the CI between the shifted and original plan is the smallest for the 6 cm overlap length. The smallest relative dosimetric deviations from the original non shifted plan are obtained for 6 cm overlap length.

Conclusion: To reduce the impact of setup errors during CSI by VMAT, the optimal length of the overlap sector using the Monaco 5.1 treatment planning system, should be around 6 cm.

PO-1008
In silico implementation of MRI-60Co RT. A dosimetric comparison in cervical cancer (SIMBAD-02)
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Purpose or Objective: The ViewRay MRI-60Co hybrid system (MRIdian) allows MRI based targeting, structure autosegmentation and direct planning for numerous anatomical districts. Our department is implementing this technology and, up to date, we are testing QA planning procedures compared to our clinical standards in order to define which districts could take advantage from the use of the MRI-60Co technology. Aim of this investigation was to assess the impact of the implementation of the ViewRay magnetic resonance imaging (MRI)-guided 60Co radiation therapy system through an in silico planning analysis for cervical cancer treatments.

Material and Methods: Patients affected by cervical cancer (cT3; cN0, cM+) were manually segmented on Eclipse TPS V11. RapidArc (6-15 MV arcs) and 5 beams (6-15 MV) sliding window IMRT treatment plans were calculated according to our usual QA protocols by skilled planners. The PTV1 (CTV1+7/10 mm margin) was represented by the tumor, the PTV2 (CTV2+7 mm margin) by drainage pelvic nodes. The OARs considered for this analysis were the body, the bowel bag and the bladder. The total prescribed dose for PTV2 was 39.6/1.8 Gy and 50.6/2.3 Gy for PTV1 through simultaneous integrated boost. The PTV V95 and OARs QUANTEC dose constraints on the DVHs and Wu’s homogeneity indexes (HI) were then analyzed to ensure the dosimetric reliability of the plans. The structure sets were then uploaded on the MRIdian workstation and a 60Co plan was calculated by beginner planners after a specific training session. The DVHs and HI were then compared to the RapidArc and IMRT gold standard in order to evaluate MRIdian’s performances.

Results: We calculated ten sets of three plans (MRI-60Co, RapidArc and 5 beams static IMRT) for ten consecutive patients. The MRI-60Co system showed a better HI when compared to the other techniques for PTV1, while this advantage could not be appreciated for PTV2, even if a better PTV1 V100 (39.6 Gy) was observed. Comparable mean doses for the bladder were registered, while a higher bowel V45 was observed (even if still in the constraints limits). Low dose body V5 was higher for the MRI-60Co system. The results are summarized in table 1.