were taken (18 to 25 per patient). Initially, the patient Set-Up, we performed portal imaging with anatomy comparison to DRRs. We compared lung, heart and breast volumes. The treatment technique was 3D Conformal Radiotherapy. The breast fields were tangential. A Couch Vertical value was determined for each patient at the Set-Up process, and all treatment sessions were performed at that Couch Vertical value. Throughout the course of radiation treatment, daily readings were taken. This included readings of the actual Anterior SSD, as well as portal images taken, to compare anatomical matching to the DRRs. At the end of each patient’s treatment course, we performed a comparison of all SSD readings, calculating the differences between planned and actual Anterior SSD readings.

Results: Average difference between the planned and actual Anterior SSD reading was 0.5 cm for all treatments (with max 1.15 cm and min 0.0 cm for single patient). For 10 patients (30% of all patients) the mean was above 0.7 cm. An upward trend was seen in the average difference along the treatment course. 70% of the patients who had a mean of over 0.7 cm - were over the age of 60. There is also an upward trend of mean of depending on age (average of 0.4 cm under the age of 60 and an average of 0.55 cm over 60 years). Mean was 0.7 cm, s 0.2 cm, s 0.64 cm (p < 0.0001). To get the accuracy and reproducibility in breast cancer irradiation, and the increasing use of IMRT (field in field), we recommend to consider re-planning for some patients, or to treating according to a fixed Couch Vertical value, set during the initial patient Set-Up. Continue further work to examine the deviations in dosimetry based on the change in IsoCenter.

Conclusion: In this study we showed that the difference between the planned and actual Anterior SSD is significant. To get the accuracy and reproducibility in breast cancer irradiation and the increasing use of IMRT (field in field), we recommend to consider re-planning for some patients, or to treating according to a fixed Couch Vertical value, set during the initial patient Set-Up.

EP-2087
Simultaneous Integrated Boost Bilateral breast cancer RT with Helical IMRT: How to manage it?
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Purpose or Objective: The objective of the present case study was to investigate the potential role and the feasibility of Helical intensity modulated radiotherapy, (Tomotherapy, Accuray), for bilateral breast tumor patients, with a simultaneous integrated boost (SIB) strategy.

Material and Methods: Four target volumes were defined by the radiation oncologist: PTV breast (right and left) and PTV boost (right and left). Dose prescription in a SB arc scheme was: 50.4 Gy (1.8 Gy/fraction) to PTV breast (right and left), 61.6 Gy (2.2 Gy/fraction) to PTV boost right side and 59.36 Gy (2.12 Gy/fraction) to PTV boost left side. Objectives were: for PTVs V50g = 95%; Mean lung dose MLD = 15 Gy, V20 = <20%, V50 as low as possible; for the heart: a Mean dose < 7 Gy. The plan was generated with Tomotherapy planning station 5.0.5.18 (Volo, Accuray), with a field with of 2.5 cm, pitch of 0.287 and a modulation factor of 3.8. Specific optimization volumes were created by the dosimetrist to avoid high integral dose and to achieve a very conformal and homogeneous dose distribution. Treatment time will be measured.

Results: For PTV breast right and PTV breast left, V50 was 95.05%. For PTV boost right and PTV boost left the V50 was 97.9% and 96.8%, respectively. Mean lung dose was 8.6 Gy for each lung. V20 for both lungs combine was 13.8%, and V50 as 35.6%. Mean heart dose was 3.8 Gy with a maximum dose of 37 Gy. The irradiation treatment time is around 7 minutes.

Conclusion: This case show a very promising and feasible role of Helical IMRT, for bilateral breast tumor patients, with a simultaneous integrated boost (SIB) strategy. A good treatment planning strategy is fundamental to achieve the dose volume histogram (DVH) for the organs at risk (OAR) presented here.

Electronic Poster: RTT track: Additional tools for contouring

EP-2088
CT and MRI fusion to minimize contouring uncertainties in Stereotactic Radiosurgery (SRS) planning
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Purpose or Objective: To improve image registration accuracy by using markers on patients for head SRS treatment planning. Contour shifts were compared after image matching based on anatomy correspondence and markers superposition.

Material and Methods: Ten patients with head localisations planned for radiosurgery were studied. Scanning procedures using skin markers were done on CT - GE LightSpeed RT16, with 1.25mm slice thickness and MRI-GE Signa 1.5T following.
AxT2 FRFSE, AxT1 and T2FLAIR, MRPerf Ax Dynamic SI C+ and Ax 3D T1 FSPGR. Image fusion of data sets was applied after anatomic landmark matching before target contouring. Alternatively image matching was also implemented by marker superposition. Translation and rotation corrections were calculated from markers’ displacement and applied in the matching procedure. Target anatomy contours obtained from both procedures were compared and contour shifts measured. These shifts were analyzed to find how the type of matching procedure would affect target contour displacement.

Results: Coordinates of markers showed geometrical displacements (0.15cm-0.35cm) in transverse direction and rotation angles (1.5o-2.0o). These values were used for compensation in the image matching procedure, achieving visual correspondence of target anatomy after image fusion. Target contour displacement after applying both procedures were found to be within the range of 0-0.3cm.

Conclusion: The precise positioning and method using markers is essential to achieve good quality in the image matching, as well as the accuracy in the SRS. It could be improved with more than 1mm for the target and organs at risk, which makes the SRS treatment procedure itself more effective.

EP-2089
Comparison of target volumes for lower gastro-intestinal tumours using PET-CT and PET-MR images
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Purpose or Objective: The use of PET-CT in radiotherapy planning is emerging as a modality to aid target volume delineation in lower GI tumours. MRI provides superior soft tissue definition compared with CT which may offer further benefit in radiotherapy planning (Wang et al., 2011).

Since 2008, PET-CT has been used for radiotherapy planning within the department and, to date, we have scanned over 170 patients across a range of tumour sites. To explore the role of MRI in lower gastro-intestinal planning, 9 patients were dual scanned as part of a feasibility study to compare target volume delineation using PET-CT and PET-MR images.

Material and Methods: All lower GI tumours requiring a PET-CT for planning purposes were considered eligible for the study. For each patient a PET-CT and PET-MR scan was acquired in the treatment position following a single 18F-FDG radioisotope injection. The patients were allocated with 50% having the initial planning scan in PET CT and 50% in PET-MR. Duration time post injection was recorded for each scan. Prior to volume delineation both data sets were anonymised. Each clinician was provided with the relevant anonymised diagnostic imaging and tumour histopathology reports. On both datasets a Nuclear Medicine Radiologist delineated the BTV and a Clinical Oncologist delineated the gross tumour volume (GTV) and clinical target volume (CTV). Volumes for each patient were delineated on separate occasions for each imaging modality. Volume sizes for both data sets were compared and a similarity index calculated.

Results: Nine patients were entered into the study, 6 rectal carcinomas and 3 anal canal carcinomas.

When compared with volumes delineated using CT data, overall, the GTV of the rectal volumes were smaller when delineated on MRI. Due to the small number of anal canal tumours, it is difficult to draw any conclusion.

The similarity index between volumes will also be presented.

Conclusion: This initial evaluation indicates that, overall, MR delineated volumes for rectal tumours are smaller than those created using CT data. This has the potential to impact treatment planning and reduce toxicity. The study highlighted the challenges of using MR data for nodal volume delineation, indicating that a combined modality approach may be optimal. It is acknowledged that extension of this study to a larger population would allow firmer conclusions to be drawn.

EP-2090
Accurate and stable immobilisation with Lorca Marin masks for head and neck IMRT treatment
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Purpose or Objective: The aim of this work is to analyze the setup accuracy and stability resulting from the use of the Lorca Marin thermoplastic masks during the complete course in head and neck cancer treatment with intensity modulated techniques.

Material and Methods: 50 consecutive head and neck cancer treatments with intensity modulated radiotherapy (IMRT) were analyzed. Lorca Marin customised masks named Nature were used to immobilize head and neck. These 2-oxapone polymer thermoplastic masks are 3-points immobilization with frontal and mental reinforcement and 3.2 mm thickness. 3-standard references were marked on the surface of the mask and on the middle chest of the patient for accurate positioning every day. Cone-beam computed tomography scan to verify online the position was performed during 5 consecutive days and after, weekly cone-beam until the end of the treatment. After weekly matching process using automated soft-tissue registration, translational movements along the three axes (x, y, z) were collected and the average for each treatment and each axis was calculated. Displacement’s mean of the 50 averages and the standard deviations were analyzed.

Results: The resulting displacement average after analyzing 50 treatments was less than 1 mm along the three axes: x = (0.62±0.51) mm, y = (0.83±0.63) mm, z = (0.65±0.59) mm. These setup displacements have remained under than 3 mm in 100% of treatments. These results achieve the International Commission on Radiation Units and Measurements (ICRU) recommendations regarding the setup margin to compensate the immobilization and positioning errors.

Conclusion: The type of patient immobilization devices and their contribution in the setup errors must be taken into account for IMRT. Additionally, the use of different image-guidance systems can significantly alter the size of the