facility; a longer training with this mask system could lead to a reduction of translational shifts and rotations.

Electronic Poster: RTT track: Pre-treatment imaging and volume definition

EP-1620

An audit of breast cancer ct protocols in radiation therapy to establish national dose reference levels

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Purpose/Objective: Computed tomography (CT) scanning delivers ionising radiation doses that may increase the stochastic risk of malignancy. The implementation of dose reference levels (DRLs) for imaging procedures using ionising radiation is mandated by European Commission directive 97/43 EURATOM. DRLs have yet to be established for radiation therapy (RT) localisation CT scans. The purpose of this research is to establish if CT dose variation occurs for breast cancer localisation CT scans between Irish RT departments; to investigate the factors contributing to this, and to propose DRLs for this procedure.

Materials and Methods: All Irish RT departments were invited to complete a dose audit survey for 10 average-sized breast cancer patients undergoing a CT localisation scan. The data requested included: Computed Tomography Dose Index: Volume (CTDIvol), Dose Length Product (DLP), current-time product (mAs), tube potential (kVp), scan length, slice thickness, scanning margins, use of automated exposure control, and scanner technology.

Results: Data was collected on 60 scans from six departments, representing 67% of the national departments. Significant variations in mean CTDIvol and DLP were observed between departments ($p<0.0001$). Mean scan lengths and mean mAs also differed significantly between departments ($p<0.0001$). CTDIvol was more positively correlated with DLP than scan length. Proposed DRLs for breast localisation CT scans is 26mGy and 732mGy cm for CTDIvol and DLP respectively.

Conclusions: The variation in dose between departments suggests a large potential for optimisation of this procedure. CT dose variation between RT centres may be more influenced by factors affecting CTDIvol than scan length. Baseline national figures for breast cancer RT localisation CT DRLs are provided.

EP-1621

Evaluation of the reconstruction of image acquired from CT simulator to reduce metal artifact

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Purpose/Objective: This study presents the usefulness assessment of metal artifact reduction for orthopedic implants(O-MAR) to decrease metal artifacts from materials with high density when acquired CT images.

Materials and Methods: By CT simulator, original CT images were acquired from Gammex and Rando phantom and those phantoms inserted with high density materials were scanned for other CT images with metal artifacts and then O-MAR was applied to those images, respectively. To evaluate CT images using Gammex phantom, 5 regions of interest(ROIs) were placed at 5 organs and 3 ROIs were set up at points affected by artifacts. The averages of standard deviation(SD) and CT numbers were compared with a plan using original image. For assessment of variations in dose of tissue around materials with high density, the volume of a cylindrical shape was designed at 3 places in images acquired from Rando phantom by Eclipse. With 6 MV, 7-fields, 15 × 15 cm2 and 100 cGy per fraction, treatment planning was created and the mean dose were compared with a plan using original image.

Results: In the test with the Gammex phantom, CT numbers had a few difference at established points and especially 3 points affected by artifacts had most of the same figures. In the case of O-MAR image, the more reduction in SD appeared at all of 8 points than non O-MAR image. In the test using the Rando Phantom, the variations in dose of tissue around high density materials had a few difference between original CT image and CT image with O-MAR.

Conclusions: The CT images using O-MAR were acquired clearly at the boundary of tissue around high density materials and applying O-MAR was useful for correcting CT numbers.

EP-1622

Delineation of the CTV-breast performed by RTTs and radiation oncologists: a comparative study

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Purpose/Objective: Radiation oncologists currently delineate the Clinical Target Volume (CTV)-breast (glandular breast tissue) in patients referred for whole breast irradiation. To optimize the efficiency of this process, it would be useful to know whether the RTTs can adequately delineate the CTV-breast. We therefore, compared the delineated CTVs of the RTTs with those of the radiation oncologists. The aim of this study was to assess if the conformity index of the CTV-breast was >0.8 for both groups. We also examined if it would be feasible for the RTTs to delineate the CTV-breast and what would be the best procedure.

Materials and Methods: Ten RTTs and 2 radiation oncologists delineated the CTV-breast of 5 patients: 3 left-sided cases and 2 right-sided cases. The RTTs were previously trained by the specialized radiation oncologist so they would not start from scratch.

The delineations of the RTTs and radiation oncologists were compared with each other in MatLab. This program calculates the conformity index (CI of two CTVs is defined by the ratio of the intersecting volume and the encompassing volume). The CI is represented by a number between 0 and 1. When the CI is 0, there is no similarity at all between the two compared volumes. When the CI is 1, the two delineated volumes are completely identical.

For this study the CI of the CTV-breast needed to be >0.8. Furthermore, we used the same method as Struikmans et al. to compare the derived CIs for all RTTs with those of the delineation of the 2 radiation oncologists [1].

Results: The mean CI for each single patient was higher than 0.8 for the RTTs and radiation oncologists together. In both separate groups the mean CI was higher than 0.8 as well, the values are indicated in table 1.

Conformity Index

	RT oncologists + RTTs	RTTs	RT oncologists
Patient 1	0.901	0.901	0.898
Patient 2	0.904	0.911	0.867
Patient 3	0.875	0.872	0.876
Patient 4	0.912	0.911	0.926
Patient 5	0.920	0.918	0.923
Average of the pts	0.902	0.903	0.898
Standard deviation	0.017	0.018	0.027

Table 1. Conformity Indices

The results show that the CI of the CTV-breast for the RTTs and radiation oncologists do not differ significantly. In addition we noted that the visual differences are mainly located on the lateral, medial and dorsal side of the breast. This is shown in the figure below.

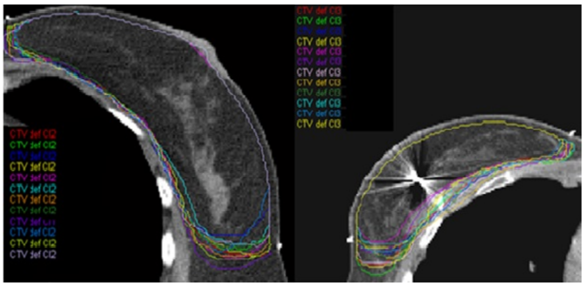

Figure 1. patient no.2 and no.3, delineations of RTTs and radiation oncologists

Conclusion : With a mean CI of about 0.9 for both groups, the CIs were >0.8 for the five delineated patients.

Recommendations: We recommend that RTTs will delineate the CTV-breast in our radiotherapy department. When the RTTs delineated the CTV-breast, this will be supervised by the radiation oncologists. Both the RTTs and the radiation oncologists need to work according to the delineation guidelines. The final approval must be done by the radiation oncologist.

Based on the average number of 100 patients treated with breast conserving radiotherapy per year we recommend that five RTTs need to be trained to delineate the CTV-breast in breast conserving radiotherapy. In our opinion it is enough when the five RTTs delineate at least twenty patients a year.

[1] H Struikmans et al., Radiother Oncol. 2005

EP-1623

Contouring of critical organs in pelvis area in postoperative radiotherapy - problems and solutions

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Purpose/Objective: Contouring organs at risk is generally performed by the RTTs. These organs in the lower pelvis have large variations, especially in patients undergone surgical treatment. The objective of the study is to analyze the contouring process of organs at risk in lower pelvis in patients undergoing postoperative radiotherapy, to present the most frequently observed problems and to point out the solutions to overcome them.

Materials and Methods: Postoperative treatment was applied to 157 patients in 'Tokuda Hospital Sofia' in the period XI.2009 – XI.2014. From the total number 28 patients were operated due to prostate carcinoma and 129 patients due to carcinoma uteri. Patients were scanned on a CT LifgtSpeed^{TM}RT^{16} with the protocol for Pelvis scanning without intravenous contrast. The patients were prepared for CT scanning and irradiation with empty bladder. The protocol Helical full, 1,0 sec rotation speed, pitch 0.938:, thickness/interval 0.5 mm; Large FOV; Auto mA. A planning system ERGO++ was used to contour organs at risk. Obtained data were CT processed using Microsoft ExcelTM.

Results: It was found in 10% of male patients have expressed atony of the bladder and 30% showed severe incontinence. Within the female patients 30% showed atonia and only 10% have incontinence, but at considerably lower level. Within prostate cancer patients there were no cases showing lymphocele. Among the patients operated from carcinoma uteri 20% were found with significant degree of lymphocele, as in 5% of them additional surgical treatment was applied. In one patient bilateral aneurism of the common iliac arteries was found.

Conclusions: The knowledge of the normal anatomy of lower pelvis and the capabilities for contouring organs at risk has been incorporated into the modern planning algorithms and allows reduction the dose in the organs at risk. There are often considerable aberrations in the anatomic localization, shape and size of the organs at risk in the patients undergone surgery. This requires high level of knowledge of those variations, individual approach and very often directing the patient for additional surgical treatment. Such requirements raise creativity in the skills of RTTs at a new higher level. Thus, the team working capabilities of RTTs together with the physicians are improved and patients are provided with best choice of treatment.

EP-1624

A one-stop palliative treatment with a CBCT as planning-CT

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Purpose/Objective: Institute Verbeeten is located in 3 cities, Tilburg, Breda, and 's-Hertogenbosch. Only in Tilburg we have access to a planning-CT scan. As patients have to travel for the CT scan a method has been developed to use the CBCT as