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
S. O’Connor1, O. McArdle1, L. Mullaney1
1Trinity College Dublin, Discipline of Radiation Therapy, Dublin 8, Ireland Republic of
2St Luke’s Radiation Oncology Network at Beaumont Hospital, Department of Radiation Oncology, Dublin 9, Ireland Republic of

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
J.H. Choi1
1Seoul National Univ. Bundang Hospital, radiation oncology, Seongnam Gyeonggi-Do, Korea Republic of

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 x 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
M. Kouijzer1, M. Willems2, M. Mast1, A. Petoukhova1, A. Verbeek-de Kanter1, H. Struikmans1
1Radiotherapy Centre West, Radiotherapy, The Hague, The Netherlands

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.