POSTER: RTT TRACK: PATIENT PREPARATION, PATIENT IMMOBILISATION AND SUPPORT AIDS

PO-0922

Evaluation of respiratory reproducibility and dose reduction by deep inhalation breath hold for breast irradiation

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Purpose/Objective: Deep inhalation breath-hold (DIBH) for postoperative, left-sided, breast irradiation is known to be an effective technique for reducing the dose to the heart. Respiratory phase reproducibility of DIBH and planning dose reduction were investigated.

Materials and Methods: DIBH was applied to 17 patients for postoperative, left-sided, whole breast tangential radiotherapy with 50 Gy in 25 fractions after breast-conserving surgery between February and August 2012. Respiratory phase reproducibility was assessed by measuring multiple clip position three times on the surface of lesion of planning CT images under DIBH. Immediately before first fraction delivery, an electric portal imaging device (EPID) was used to register the breast position with digitally reconstructed radiography (DRR). During the rest of the fractional deliveries, setup errors were recorded by calculating EPID image isocenter differences between the day and the first day. During dose delivery, EPID cine mode was used to continuously monitor the breast position. Doses delivered to the left anterior descending coronary artery (LAD) were evaluated on the planning CT, and D5, mean dose, V5, and V40 in the heart were calculated.

Results: The standard deviation of the measured clip positions from the three planning CT images under DIBH were 0.40 mm in the lateral direction (RL), 0.85 mm in the anteroposterior direction (AP), 1.12 mm in the craniocaudal direction (CC), Fig.1 shows the scatter gram of the clip positions for the 17 patients. The measured EPID isocenter shift from the initial EPID verified by DRR image was 2.41±1.64 mm (standard deviation) in CC and 1.93±1.64 mm in AP for the 17 patients. A random error was calculated as a root mean square of the standard deviation for each patient over the 17 patients: 1.72 mm in CC and 1.27 mm in AP. A systematic error was given by a standard deviation of mean isocenter shift for each patient over the 17 patients: 1.04 mm in CC and 0.92 mm in AP. The LAD D5, mean dose, V5, and V40 were 10.76±7.73 Gy, 4.41±1.6 Gy, 19.63%±15.19%, and 0.034%±0.058%, respectively, under DIBH. In simulation planning using breath-free CT, LAD D5, mean dose, V5, and V40 were 36.36±12.11 Gy, 13.42±5.5 Gy, 48.31%±8.37%, and 10.85%±12.25%, respectively. DIBH significantly reduced the dose to the LAD compared with free-breathing CT.

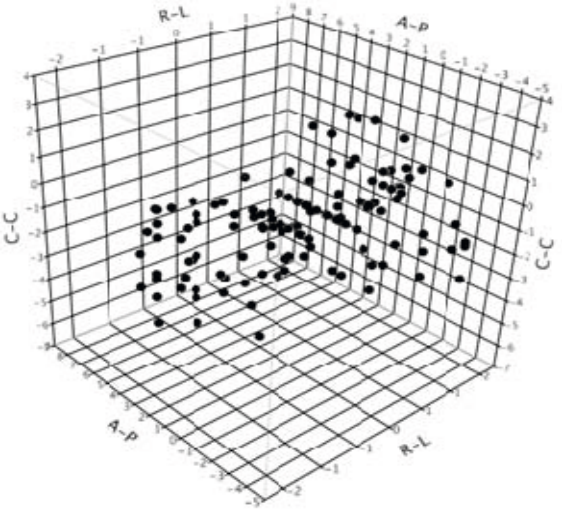

Fig.1

Conclusions: It was confirmed that DIBH provided good respiratory reproducibility, and the dose to the LAD was insignificant. DIBH significantly reduced the dose to the LAD.

PO-0923

Patientsí set-up and dose delivery verification for total marrow or lymphoid irradiation with helical Tomotherapy.

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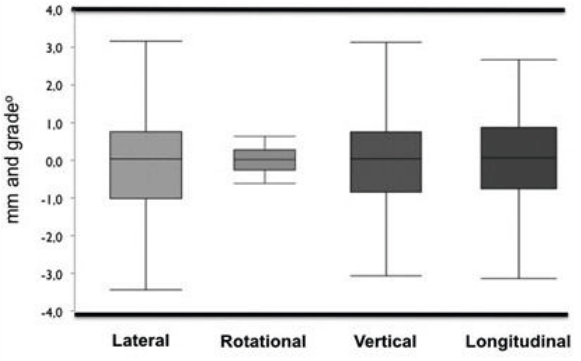
Purpose/Objective: New technology improvements allow to deliver large fields and extremely modulated treatments as total marrow irradiation (TMI) or total lymphoid irradiation (TLI) for a specific subset of onco-hematological patients. These complex treatments need a precise, comfortable and reproducible patient's positioning. We investigate the feasibility of set-up and dose delivery verification for patients who underwent to TMI and TLI with Helical Tomotherapy (HT).

Materials and Methods: Between March 2009 and April 2012, forty-five patients underwent to TMI (35) and TLI (10). The Clinical Target Volume (CTV) covered all the major lymphatic stations, from the neck to the inguinal region and whole body bones respectively for TLI and TMI. A 4 mm CTV expansion defined the Planning Target Volume (PTV). Set-up was performed with patients in supine position with 3 thermoplastic masks for head, thorax and feet.Three Mega Voltage CT (MVCT) defined the right position for the upper, middle and lower part of the target before every treatment delivery. To measure the in-vivo radiation dose distribution, GafChromic® films and MOSFET dosimeters were placed on the sternum and abdomen for TMI and on the skin of axilla, inguinal and parotid region for TLI.

Results: The means of the corrections for rotational, longitudinal, lateral shifts respectively for head, thorax and pelvis define the set-up of patients.The shift range never exceeded the PTV margins and the most frequent reported set-up error corrections were lower than 2 mm. The measured point dose of two different kind of dosimeter was compared with the adapted dose recalculated with HT adaptive software. The differences between dose planned with adaptation and measured in-vivo were under 20%. The patients' compliance was good and ameliorated with an open mask for the head.



Conclusions: Set-up of patients for TMI/TLI HT treatments is feasible and reproducible. Patients can tolerate well long treatment time delivery. Adaptive software should be a good alternative of in-vivo dosimetry.

PO-0924

Investigation of shrinkage effect and reproducibility of thermoplastic cast for head region

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Purpose/Objective: The purpose of this study is to investigate the differences in set up accuracy in terms of shrinkage effect and reproducibility between the thermoplastic casts from two manufacturers: Orfit and CIVCO, in the head region.