Non-Reflective Brass Mesh Bolus and Surface Guidance

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PURPOSE

The study presents a solution to treatment planning and intra-fraction monitoring using a surface guidance camera system for a complex body shape (chestwall) requiring tissue-equivalent bolus.

METHOD

Patients to receive external beam radiotherapy treatment of left or right chestwall requiring bolus were planned in Varian Eclipse v13.7. Contours drawn outside of the radiation field were assigned to the beam as a surrogate bolus structure (Fig. 1 blue arrow). Due to the minimal thickness (1.5 mm per layer) of the non-reflective brass mesh bolus (NRBMB), dose at depth is not significantly changed. A treatment plan requiring the traditional 0.5 cm superflab bolus can utilize 2 layers of NRBMB as the tissue equivalent thickness is 2.0 mm – 3.0 mm. Initial evaluation of NRBMB on a solid water phantom with Align VisionRT (VRT) camera system confirmed visibility; motion was simulated using couch shifts and verified in VRT software. DIBH treatments with a surface guidance system and NRBMB tested for congruence.

FIGURES AND TABLES

Fig. 1 View from TPS of contour (in blue) created for the purpose of assigning to field as "bolus"

Fig. 2 Non-reflective brass mesh bolus has white enamel coating. Patient surface and motion detectible by camera system.

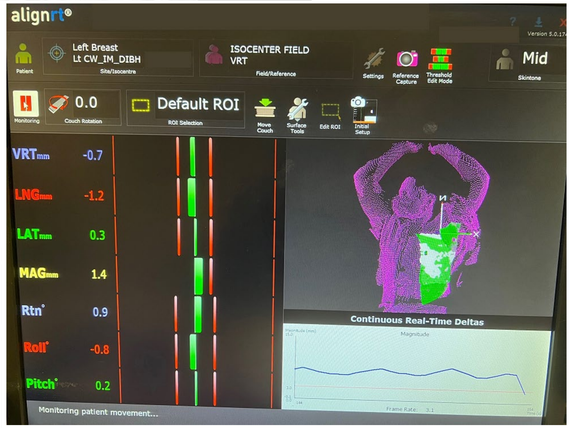

Fig. 3. Patient surface monitoring during left DIBH treatment with non-reflective brass mesh bolus.

RESULTS

No plan revision required in Eclipse if/when NRBMB removed mid-prescription. The NRBMB on the patient chestwall allowed the surface guidance system to track the patient motion. Patient respiratory motion tolerance was able to be at our department standard +/-3 mm range. Coincidentally, our department increased treatment of right-sided chestwall DIBH patients with the NRBNB. The success of NRBMB was adapted and traditional brass mesh bolus utilization became minimal. Due to the metal nature of the NRBMB it was helpful to warm prior to placing on patient.

DISCUSSION & FUTURE

Patients with complex body contours who require bolus for treatment can benefit from NRBMB. The surface guidance camera system tracks patient motion when the NRBMB is applied. Knowing the physician preference for bolus thickness, placement, and treatment modality is essential for accurate application and treatment delivery. Improving visualization using VRT and quantifying respiratory motion allowed for implementation of accelerated dose protocols for treatment of breast cancer.

References: Manger, R., Paxton, A., Cervino, L. *Dosimetric assessment of brass mesh bolus for postmastectomy photon radiotherapy.* J Appl Clin Med Phys. 2016 17(6): 86-96.

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