

**Purpose of Study:** To report a novel monoisocentric technique to deliver bilateral chest wall and comprehensive nodal radiotherapy using intensity modulated proton therapy (IMPT).

**Methods & Materials:** Patient, RC, is an 83 year old female with bilateral breast cancer ER/PR+, Her-2 -, post bilateral mastectomy, axillary dissection, with right breast pmT2N1 2.5 cm invasive ductal carcinoma, 2/19 +LNs; left breast pT2N2a IDC 3.4 cm 6/12 + LNs. Adjuvant IMPT was delivered to the bilateral chest walls, bilateral axillary, supraclavicular nodes, and internal mammary lymph node on the right side. The prescribed dose was 50.4 Gy (RBE) in 28 fractions. An IMPT plan was generated using a single isocenter without any couch rotation or shift to maximize delivery efficiency. The plan was robustly optimized with multiple field optimization using three fields-AP, LAO and RAO. In between the fields, gradient junctions of approximately 8 cm were created to improve setup robustness (Fig1). Non-ionizing surface imaging was used for initial patient set up and intra-fraction motion monitoring.

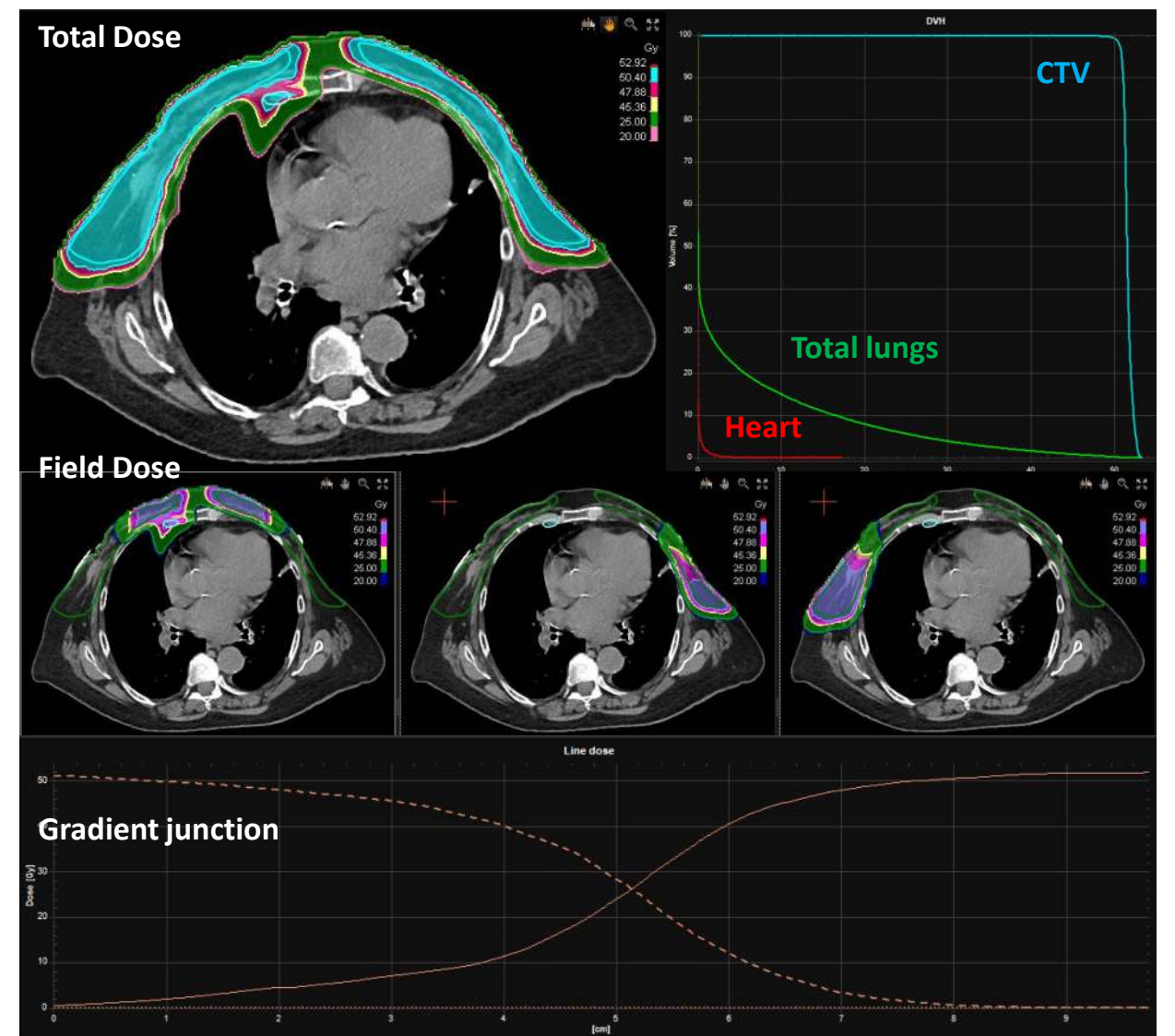


Figure 1: Dose distribution for total dose, dose field by field and gradient junction between two fields.

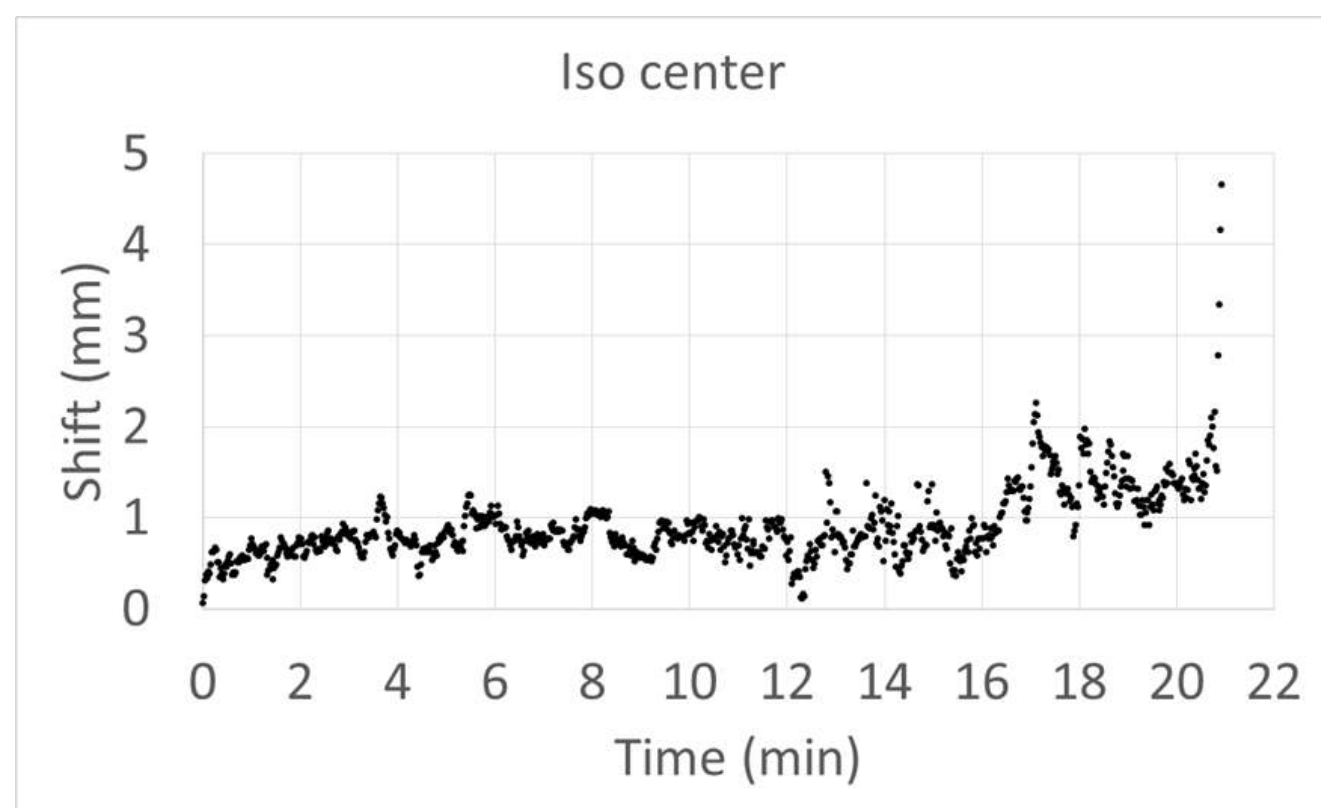
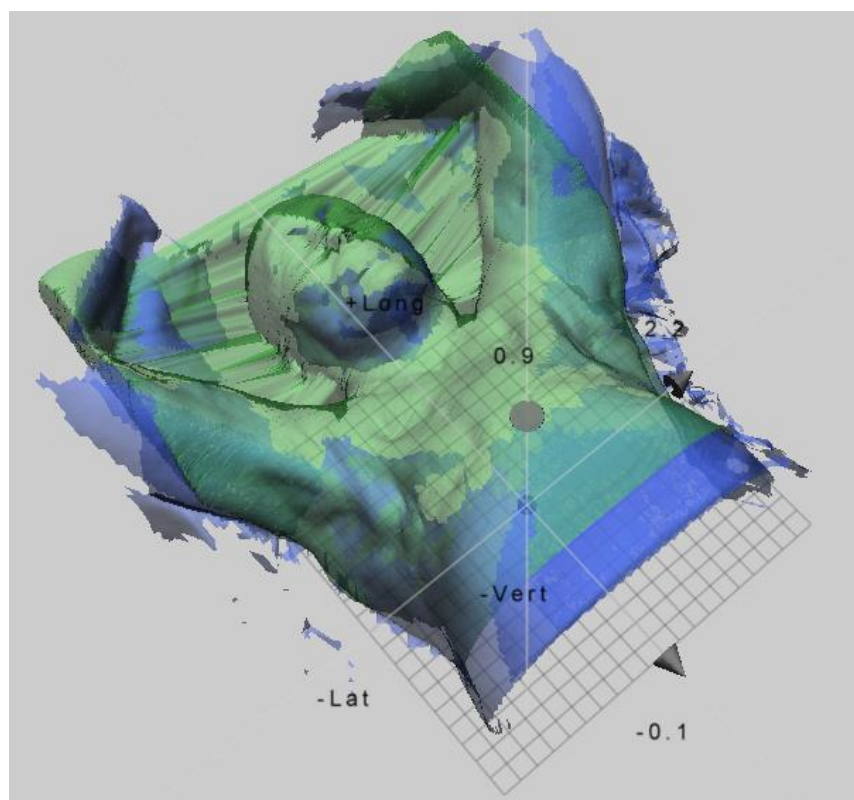


Figure 2: Surface imaging for setup and intrafraction monitoring.

**Results:** The heart mean dose was 0.06 Gy with total lung V20Gy and V5Gy of 8% and 21%. Total CTV D99% was 50.4 Gy in nominal plan, and 47 Gy in the worst case scenario (5 mm setup errors and 3.5% range uncertainty) in robustness evaluation. For daily patient setup, the Intra-fraction motion monitored by the surface imaging was within 3.5 mm variations (Fig2).

**Conclusion:** This monoisocentric, IMPT approach is a novel and highly efficient technique to deliver bilateral chest wall and comprehensive nodal radiotherapy with favorable target coverage, cardiac and lung sparing.