

AbstractID: 7610 Title: Helical Tomotherapy Planning for Left-Sided Breast Cancer Patients with Positive Lymph Nodes: Compared to Conventional Multi-Port-Breast Technique

Purpose: The objective of this study was to evaluate the feasibility of using helical tomotherapy for left-sided breast cancer patients with involved lymph nodes.

Method and Materials: Four left-sided breast cancer patients treated using conventional multi-port-breast technique were retrospectively planned on Tomotherapy planning system. PTVs including chest-wall/breast, supraclavicular, axillary and internal-mammary lymphnodes were contoured. Optimized treatment plans were generated on Tomotherapy TPS using 25mm field-width with pitch of 0.42. The modulation factors varied from 1.5-2.6. All plans had a prescription of 50.4Gy to 93% and 46.9Gy to 98% of the PTV. Directional blocking was used on the right side to limit the dose to the contra-lateral-breast and lung. The optimization goals for planning were to protect the heart and lungs from receiving excessive doses. Resulting plans were compared against a conventional multi-port breast technique. Lung toxicities using the Lyman-Kutcher-Burman model were estimated for tomotherapy plans. The parameters used for these calculations are $TD_{50\%}=30.8\text{Gy}$, $\text{slope}(m)=0.37$ and the exponent(a)=1.

Results: Tomotherapy increased the minimum dose to the PTV ($D_{99\%} = 44.6\text{Gy}$ for tomotherapy versus 30.5Gy for 3D) while improving the homogeneity index ($HI = 1.16$ for tomotherapy and 1.52 for 3D). The mean $V_{20\text{Gy}}$ for the left lung decreased from 32.6% (3D) to 16.4% (tomotherapy) while keeping the mean right lung dose well under 4Gy. However, the mean $V_{5\text{Gy}}$ volume increased from 26.4% (3D) to 42.6% (tomotherapy). The mean $V_{35\text{Gy}}$ for the heart decreased from 6.5%-2.5%, while the mean heart dose increased from 9.5Gy-11.3Gy for conventional and tomotherapy, respectively. The estimated NTCP for lung range from 1.4% to 2.4% for tomotherapy plans.

Conclusion: Tomotherapy plans have better conformity and dose homogeneity than the 3D- plans. Tomotherapy provided improved sparing for the heart and lungs.

Conflict of Interest (only if applicable): This work supported in part by Tomotherapy, Inc.