

AbstractID: 4974 Title: Comparison of TomoTherapy with Conventional Electron/X-Ray Treatment Plans for Chest Wall

Purpose: Post-mastectomy radiotherapy (PMRT) of the chest wall (CW) often will involve use of electron beams due to their rapid fall-off of dose near the practical range of the electron energy. The TomoTherapy helical, fan-beam delivery system, along with the inverse-planning optimizer, has the potential to provide planning and delivery of 6 MV x-rays to superficial target volumes conventionally treated with electrons. In the present study, five chest wall patients were planned for TomoTherapy and compared to their conventional plan that utilized electron beams. Analysis of breathing motion were not included.

Methods and Materials: Five PMRT patients treated with electron beams and planned on the Pinnacle treatment planning system (TPS) were selected. A planning target volume (PTV) was generated to follow the isodose contour defined by 90% of the prescribed dose on the Pinnacle plan. Target dose homogeneity in the Tomotherapy TPS dose optimizer was relaxed to better achieve critical structure dose objectives when necessary. Normal tissue complication probabilities (NTCP) were calculated for the lung and the heart. A questionnaire form was provided for the radiation oncologist to evaluate each plan.

Results: For all cases, the TomoTherapy plan was rated superior to the Pinnacle plan by the radiation oncologists. The TomoTherapy TPS produced a significantly more uniform dose distribution in the PTV. The average volume of ipsilateral lung receiving dose above 20 Gy was reduced from 21.5% to 17.7%. The average volume of heart receiving dose above 30 Gy was reduced from 2.2% to 1.3%. NTCP for the lung and heart were also reduced in the TomoTherapy plan.

Conclusion: The results of this study demonstrated that TomoTherapy is able to deliver clinically-acceptable dose distributions to a "static" model of PMRT patients conventionally treated with electron beams.

Supported in part by a research agreement with TomoTherapy, Inc.