

Significant Reductions in Heart and Lung Doses Using IMRT for Left Sided Breast Cancer Patients

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Abstract

Introduction

Various radiation techniques include Three Dimensional Conformal Radiotherapy (3DCRT), breath hold and Intensity Modulated Radiotherapy (IMRT) are used to irradiate the breast and to limit the dose to the heart and lungs. IMRT is used as a class solution for cardiac protection in left sided breast cancer patients.

Aim of the work

To evaluate heart and lung sparing effects of tangential beam IMRT whilst maintaining target coverage compared with tangential beam 3DCRT for left sided breast cancer patients

Methods

CT simulation was done for thirty left sided breast cancer patients who underwent conservative surgery. Planning target volume (PTV), heart and ipsilateral lung were contoured. 3DCRT and IMRT plans were generated for 50Gy using opposed tangential medial and lateral photon beams. Five segments were generated for each IMRT field. Heart V_{5Gy} , V_{20Gy} , V_{30Gy} and V_{40Gy} and ipsilateral lung V_{20Gy} , mean dose, PTV $D_{95\%}$, PTV D_{max} and dose homogeneity index were compared using Wilcoxon Signed-Ranks test.

Results

IMRT plans achieved significant reduction of 12%, 15%, 21% & 53% in heart V_{5Gy} , V_{20Gy} , V_{30Gy} and V_{40Gy} and of 18% & 11% in ipsilateral lung mean dose and V_{20Gy} compared with 3DCRT (p values <0.001). PTV coverage was adequate and comparable in both plans (P for PTV $D_{95\%}$ & $D_{max\%}$ =0.188 & 0.553). The dose homogeneity within PTV was significantly better with 3DCRT ($P=0.004$).

Conclusion

Tangential beam IMRT in left sided breast cancer leads to a significant dose reduction in heart and ipsilateral lung with comparable target coverage compared to tangential beam 3DCRT