



Dosimetric Evaluation of DIBH and FB techniques by using VMAT for Left Breast Cancer

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Purpose:

Radiotherapy is an effective treatment method for managing breast cancer, but patients may have cardiac disease as a late radiation effect after completing radiotherapy. The left anterior descending coronary artery (LAD) dose and mean heart dose are playing a major role for cardiac disease. We aimed to compare deep inspiration breath-hold (DIBH) and free breathing (FB) techniques dosimetrically for left breast radiotherapy while using VMAT method.

Methods:

Sixteen early stage left breast cancer patient's treatment planning were performed using Monaco 5.11® TPS for DIBH and FB techniques. We used C-RAD Catalyst® surface guided radiotherapy gating device for DIBH technique. The prescribe dose was 60 Gy to tumor bed and 46 Gy to breast in 28 fractions by simultane integrated boost (SIB). We aimed to achive a similar dose conformality for PTV (tumor bed) and PTV (whole breast) while optimizing two technique's plan, then we compared mean heart dose, max. heart dose, mean LAD dose, V20 Gy, V10 Gy and V5 Gy doses percentage of lung volume.

Results:

A statistically significant interaction existed between heart, LAD doses and DIBH technique. We determined an average %22 lower max. heart doses, %33 lower mean heart doses and %29 lower mean LAD doses with DIBH technique, also, an average lung volume were enlarged %66. We didn't determine significant percentage difference for V5 Gy, V10 Gy and V20 Gy doses of lung volume between two techniques.

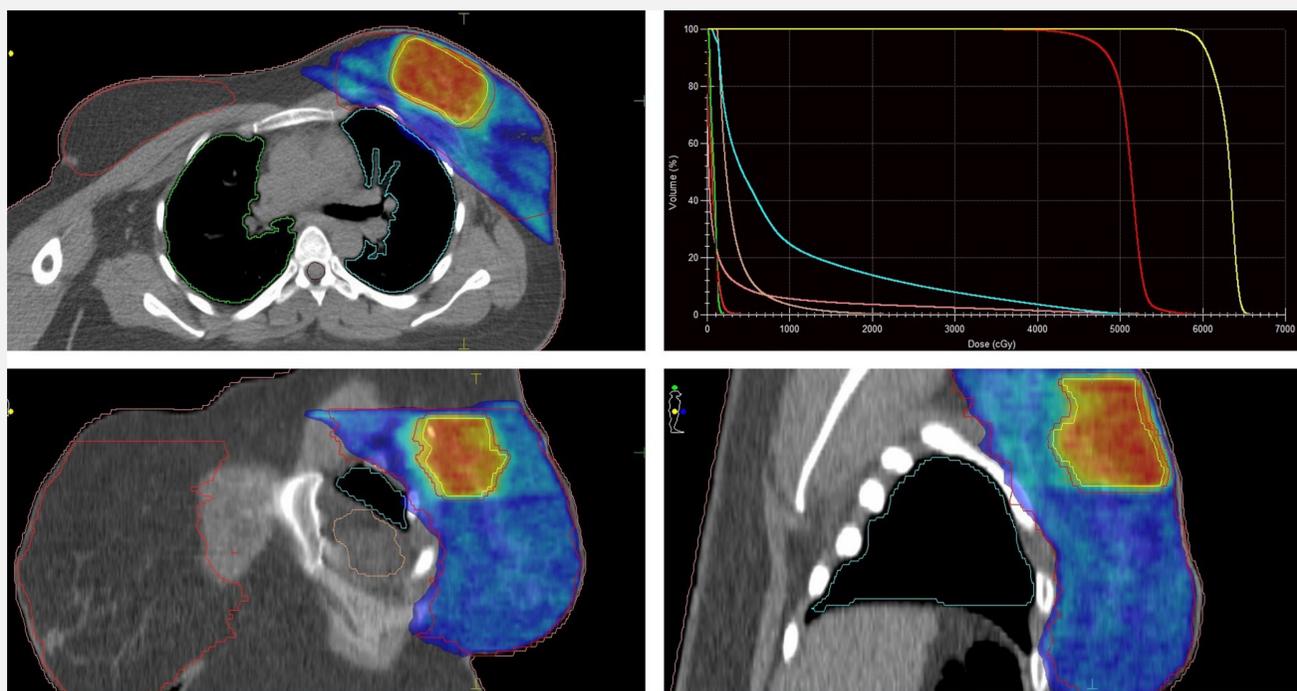


Figure: Dose distribution of early stage left breast cancer with DIBH by using VMAT technique

Conclusions:

However, we achieved an average 3.8 Gy mean heart doses, 9.0 Gy mean LAD doses and 40.4 Gy max. heart doses with FB technique by using VMAT method, Darby et al. have shown that the relative risk of ischemic heart disease increases with %7.4 per Gy increased mean heart dose, Hence, we even reduced significantly mean heart, max. heart and mean LAD doses with DIBH technique. Therefore, DIBH technique while using VMAT method may decrease cardiac disease possibility for left breast radiotherapy more than FB technique.