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Comparison of cardiac and lung doses between free breathing and deep inspiration breath hold technique for breast irradiation: A dosimetric study

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Purpose: To investigate the cardio-pulmonary doses between deep inspiration breath hold (DIBH) and free breathing (FB) technique in left sided breast irradiation

Materials & Methods: DIBH CT and FB CT were acquired for 10 left sided breast patients who underwent whole breast irradiation with or without nodal irradiation. Three fields single isocenter technique were used for patients with node positive patients along with two tangential conformal fields whereas only two tangential fields were used in node negative patients. All the critical structures like lungs, heart, esophagus, thyroid, etc. were delineated in both DIBH & FB scan. Both DIBH and FB scan were fused with the DICOM origin as they were acquired with the same DICOM coordinates. The critical structures of the FB scan were transferred to the DIBH dataset with reference to the DICOM origin. Plans were created in the DIBH scan for a dose range between 45-50 Gy in 25 fractions. Critical structures doses were recorded from the dose volume histogram for both the DIBH and FB data set for evaluation.

Results: V25 (relative volume receiving 25 Gy and more) for heart were reduced from 19.14% (FB) to 3.68% (DIBH) using the breath hold technique. Ipsilateral lung V20 volume was also reduced between 25% and 15% with DIBH compared to FB technique.

Conclusion: DIBH shows a substantial reduction of cardiac and pulmonary doses compared with FB technique. Using the simple DIBH technique we can effectively reduce the cardiac morbidity and lung pneumonitis.

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