

Purpose

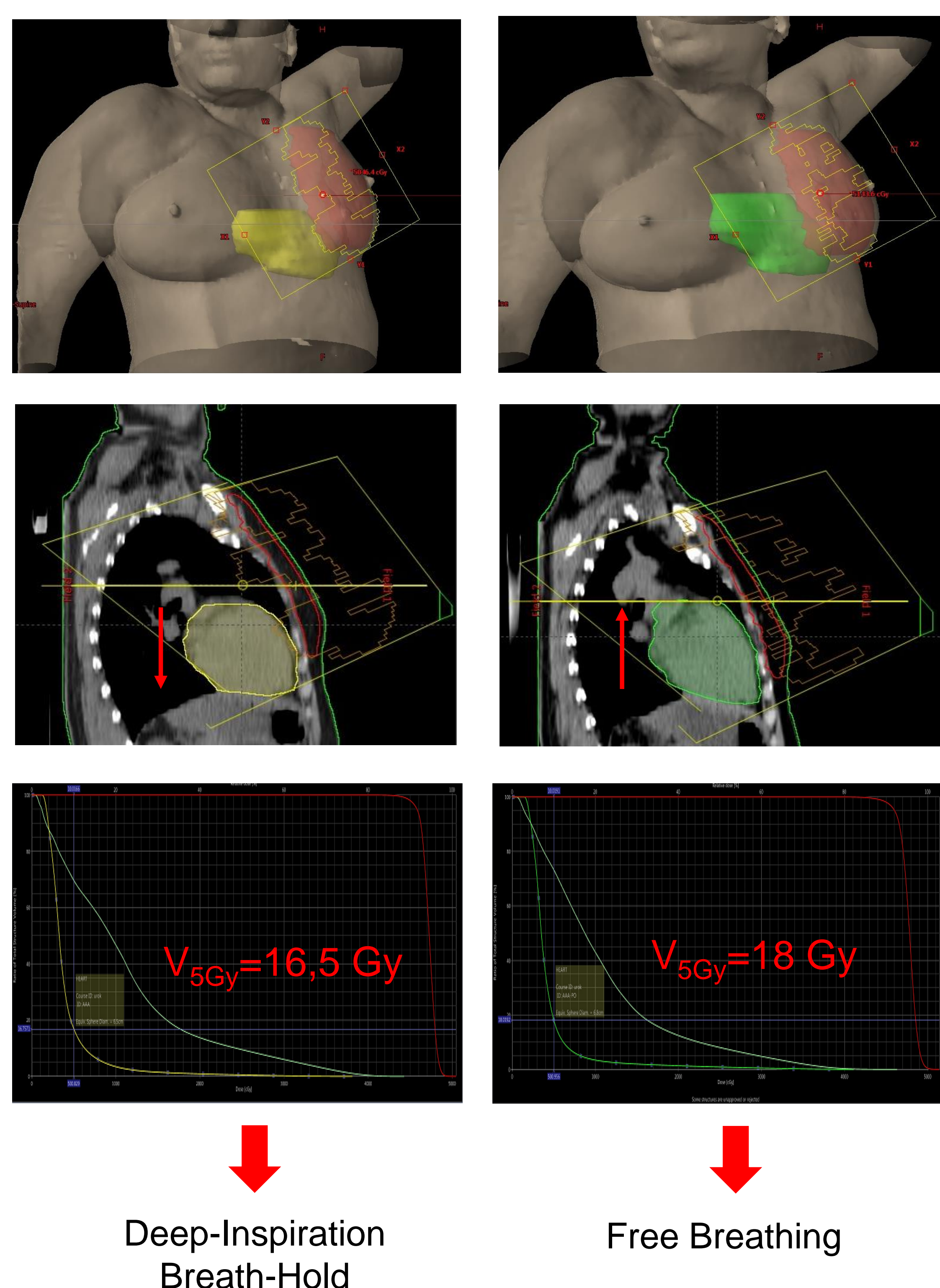
Volumetric Arc Therapy (VMAT) has become one of the most frequently used techniques in the treatment of left breast cancer radiotherapy due to its ability to reduce critical organ doses. In patients with left breast cancer, it is very important to reduce the amount of irradiated heart dose-volume in order to prevent possible cardiovascular morbidity associated with radiotherapy. Deep inspiration breath-hold (DIBH) is a technique that delivered the radiotherapy to the left breast patients in a deep breath hold position.

In this study, VMAT plans on computed tomography (CT) images taken at different breath phases for left sided breast cancer patients were compared in terms of plan quality and risky organ doses.

Methods

In the study, early stage 10 left breast cancer patients were scanned by Philips Brilliance Big Bore 4D computed tomography machine by. Tomography images of the patients were taken in deep inspiration breath-hold and free breathing (FB) mode. VMAT plans were prepared on the CT images taken both breathing modes. Eclipse treatment planning system (TPS) was used in order to prepare radiotherapy plans. The Varian Real Time Position Management System (RPM) was used for the DIBH technique. The dose was defined as 50Gy/25 fractions. For all plans, 95% of the CTV breast volume was targeted to receive 46 Gy. In both techniques, target volume homogeneity index (HI) and conformity index (CI), critical organ doses and MU values were compared.

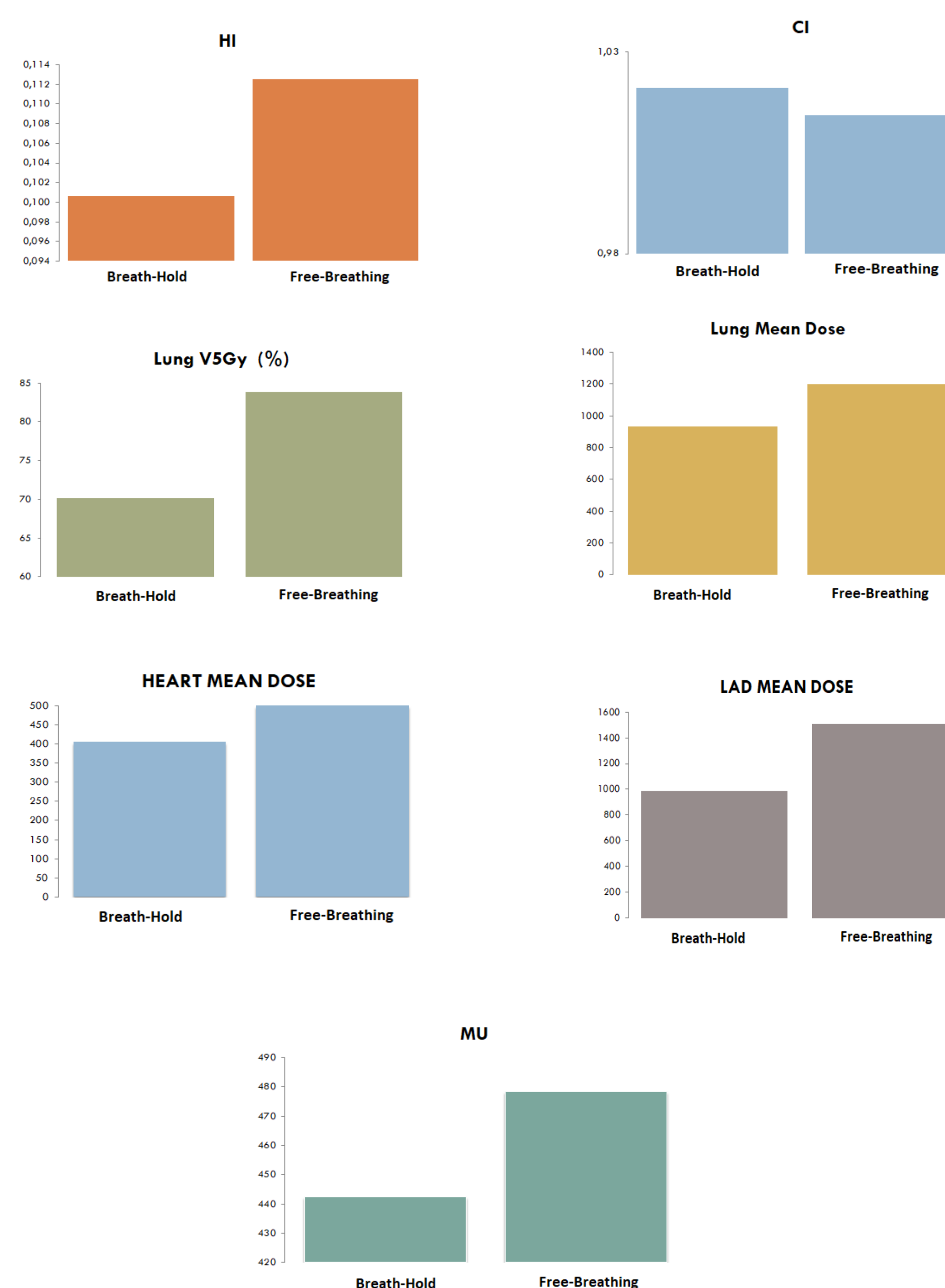
Figure 1



Results

CI values of VMAT plans prepared for both FB and DIBH CT images was found as 1.02 ± 0.04 and 1.014 ± 0.03 ; HI was found as 0.101 ± 0.018 and 0.113 ± 0.016 , respectively. In terms of dose homogeneity, DIBH-VMAT plans were found to be better than FB-VMAT plans; the difference is statistically significant. The LAD mean doses were found to be lower in the DIBH-VMAT technique ($p < 0.05$). The volume of the ipsilateral lung receiving 5 and 10 Gy; the volume of the heart receiving 5 and 10 Gy and the mean doses of heart were found lower in DIBH-VMAT ($p < 0.05$). The mean dose of contralateral breast was significantly lower with the DIBH-VMAT. MUs for DIBH-VMAT plans were found to be lower than FB-VMAT plans ($p < 0.05$).

Figure 2



Conclusions

DIBH-VMAT technique should be preferred instead of FB-VMAT technique for early stage left breast cancer irradiation.

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