DOSIMETRIC COMPARISON OF HEART AND LEFT ANTERIOR DESCENDING ARTERY (LAD) DOSES IN LEFT BREAST RADIOTHERAPY BETWEEN 3DCRT AND VMAT DIBH

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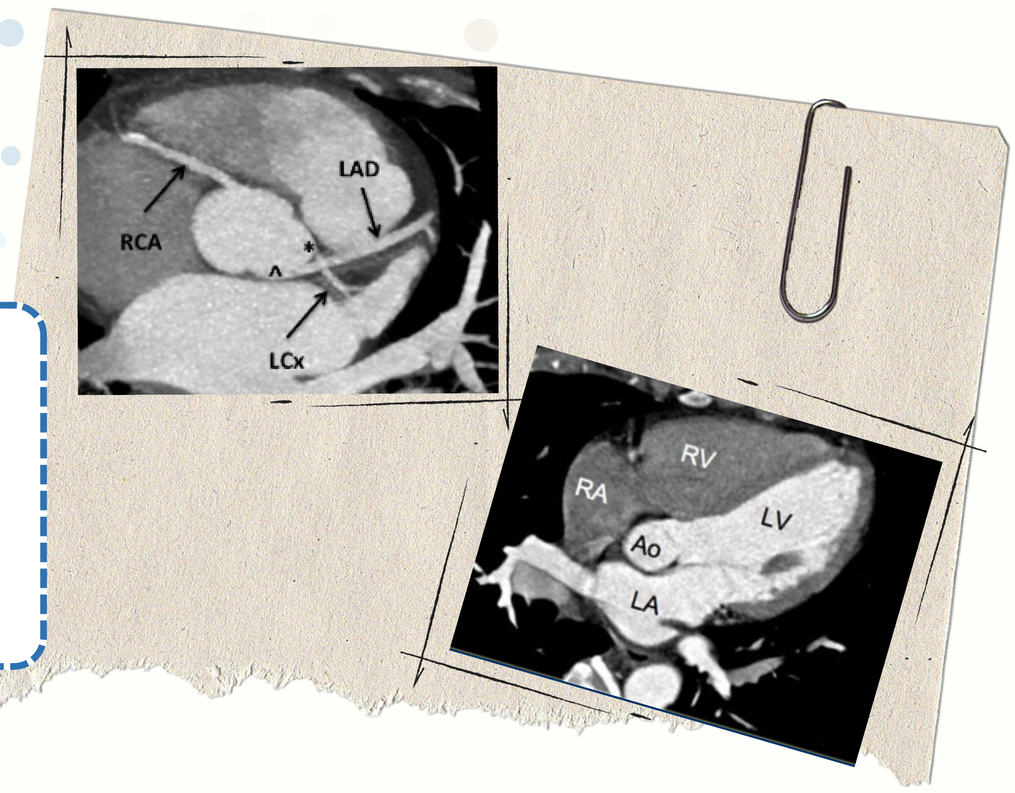

Introduction

Minimising radiation dose to heart and left anterior descending artery (LAD) is critical in reducing major adverse cardiac events. Hence, Deep Inspiration Breath-Hold (DIBH) is commonly applied in breast cancer radiotherapy to reduce cardiac exposure.

Objective

To compare the heart and LAD doses between three-dimensional conformal (3DCRT) and Volumetric Modulated Arc Therapy (VMAT) with DIBH.

Methodology

A retrospective analysis was performed on 36 left-sided breast cancer patients treated at Sunway Medical Centre in 2024.

All patients received a prescribed dose of 40Gy in 15 fractions, delivered using either 3DCRT or VMAT in combination with the DIBH technique.

Heart & LAD doses were recorded and anlaysed by independent-t or Mann-Whitney test using SPSS software.

Results & Discussion

	3DCRT	VMAT	p-value	
Heart D_{max}	39.23 Gy	36.36 Gy	0.646	>0.05
Heart D_{mean}	1.32 Gy	3.9 Gy	0	<0.05
Heart V_{17Gy}	1.0%	2.1%	0.044	<0.05
Heart V_{35Gy}	0.2%	0%	0.103	>0.05
LAD D_{max}	37.54 Gy	33.24 Gy	0.459	>0.05
LAD D_{mean}	10.24 Gy	13.43 Gy	0.121	>0.05
LAD V_{15Gy}	23.81%	37.19%	0.091	>0.05

- The findings were not consistent with recent studies that showed VMAT gives better heart and LAD sparing than 3DCRT.
- The LAD was not included in the planning optimisation, which may explain the differences.

Conclusion

Treatment plan evaluation based on cardiac substructures beyond the whole heart is essential for optimal cardiac protection, therefore this study emphasises the need to include the LAD in VMAT treatment planning.

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