


-

› you by

 [Browse Posters](#) » [Search result](#) » [Poster ECR 2022 / C-14391](#)

POSTER SECTIONS

Coverpage

Purpose

Methods and materials

Results

Conclusion

Personal information and conflict of interest

References



ECR 2022 / C-14391

Radiotherapy Techniques in Irradiation of Breast Cancer: A Dosimetric Comparison

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Purpose

Radiotherapy in breast cancer is increasingly a common treatment and is mostly prescribed to cancer patients after surgery in an adjuvant treatment. Although Three-dimensional Conformal Radiotherapy (3D-CRT) has been more commonly used in breast cancer radiotherapy, the introduction of this new Volumetric Modulated Arc Therapy (VMAT) technique, according to some studies, allows better target coverage and reduces the dose in the organs at risk compared to the previous technique (1). Although the 3DCRT technique is superior to other techniques, in low doses for normal tissue,...

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Methods and materials

A descriptive-correlational study was carried out and a total of 43 patients were included, of which 24 underwent 3DCRT and 19 were treated with VMAT, in a private Radioncology Clinic in Faro, Algarve (Portugal). The inclusion criteria covered the pathology / extension of the disease and included patients with curative intent. In the extension of the disease, patients were included in which only the breast was included, or when it included the axillary nodes. In dosimetric analysis we obtained dose-volume histograms (HDV) evaluation. Besides that,...

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Results

After obtaining the results of the organs at risk (figure 1) we can verify that in the heart, VMAT with and without axillary irradiation shows worse results. For the homolateral lung, in high doses, VMAT has a clear advantage, as we can see in the V20 values where the difference is very noted, especially in axillary irradiation, as well as in the mean. In the contralateral breast, the 3DCRT is preferable. [Fig 1] With VMAT, the contralateral breast receives more dose than with the 3DCRT....

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Conclusion

Breast cancer is one of the most common cancers, so the most appropriate treatment is essential, allowing a lower dose in the organs at risk, better conformity and homogeneity, as well as reducing the risk of secondary cancer resulting from the treatment. VMAT presents advantages comparing to 3D-CRT in cases where the cervical and axillary ganglionic nodes are involved to do the treatment. However, in selected cases based in stage and patient anatomy 3D-CRT can be a preferred technique because achieves better protection of the...

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Personal information and conflict of interest

B. S. M. Vaz: Nothing to disclose A. F. C. L. Abrantes: Nothing to disclose S. I. Rodrigues: Nothing to disclose L. P. V. Ribeiro: Nothing to disclose M. Ramos: Nothing to disclose F. Serra: Nothing to disclose B. Vicente: Nothing to disclose R. P. P. Almeida: Nothing to disclose

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Organs at Risk	3DCRT			VMAT		
	With kVly Region n=8	Without n=8	Total n=16	With kVly Region n=11	Without n=5	Total n=16
Heart 100-120	1.25	0.71	1.45	1.61	0.21	2.84
Heart 120-130	4.31	3.51	3.42	3.07	1.96	1.71
Heart 130-140	4.31	3.08	3.08	4.42	3.09	3.13
Lung PTV	17.07	24.17	24.34	47.68	33.07	44.20
Lung HRG	14.02	11.13	11.34	15.34	11.25	13.01
Mediastinal Lymph Nodes (M-LN)	9.81	8.26	8.76	7.81	7.66	7.68
Esophagus/Trachea HRG	4.45	3.71	3.48	3.39	1.88	1.94
Subcutaneous Tissue (S-T)	10.29	8.88	7.76	10.19	6.71	9.77
Large Vessels (L-V)	1.81		1.81			
Contrast-enhanced Tumor (C-T)	4.42	6.79	10.0	1.81	1.81	1.81

Fig 1: Mean values of organs at risk for 3DCRT and VMAT

	3D			VMAT		
	With kVly Region n=8	Without n=8	Total n=16	With kVly Region n=11	Without n=5	Total n=16
Conformity	1.52	1.67	1.76	1.44	1.42	1.44
Homogeneity	0.17	0.18	0.17	0.11	0.15	0.11

Fig 2: Mean values of Conformity and Homogeneity

	3D			VMAT		
	With kVly Region n=8	Without n=8	Total n=16	With kVly Region=11	Without=5	Total n=16
1 Gy	5207.55	3823.71	3821.81	8924.68	5911.10	8894.38
2 Gy	3520.52	2880.81	2881.34	5288.71	3694.48	6225.51
3 Gy	2891.24	1942.86	2171.59	3682.14	2548.28	3091.24
10 Gy	1552.53	486.85	768.80	1947.47	818.68	1020.40
20 Gy	529.11	387.12	328.48	894.62	438.05	771.50
30 Gy	678.81	287.34	458.86	488.57	301.46	350.29
40 Gy	486.56	221.79	300.26	316.07	171.85	245.55
47.5 Gy	156.81	104.42	123.96	151.86	9.87	34.81
50 Gy	95.19	51.71	88.28	1194	4.25	3.03

Fig 3: Body mean values with the exception of PTV

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