Theme: Physics **Abstract No:. PTCOG-AO2025-ABS-0088**

Title: A Retrospective Dosimetric Study to Analyze the Implementation of a Noncoplanar Beam Arrangement for Hypo radiotherapy Breast Carcinoma

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Background / Aims:

Conventional breast External beam radiotherapy (EBRT) uses 50 Gy /25 fractions with tangential chest wall fields and an AP supraclavicular (SCF) field. However, the demonstrated advantages of hypo fractionated radiotherapy (Hypo-RT) 26 Gy / 5# have led to its widespread adoption as the standard of care. On other hand radiation pneumonitis, particularly when regional nodal irradiation is a major concern for such radiotherapy. To mitigate this risk in Hypo-RT, a novel non-coplanar beam configuration has been proposed for SCF irradiation, in place of the conventional AP field. The present study aims to evaluate the clinical feasibility and effectiveness of this non-coplanar beam arrangement in treatment planning for left-sided breast carcinoma patients requiring supraclavicular nodal irradiation in Hypo-RT.

Subjects and Methods:

Thirteen patients with left-sided carcinoma, with SC node involvement, were enrolled for the Hypo-RT plan. A conventional planning for the breast 3DCRT was done using two tangential beams and one AP beam for the SCF. For the irradiation of the SCF, another non-coplanar beam was planned to minimize exposure to the lung apex. This non-coplanar approach was achieved by adjusting the treatment couch to a 90° angle, coupled with a gantry angle of 15° cranial. Dosimetric analysis was done for both the plans using the Dose Volume Histogram for the OAR and Planning Target Volume.

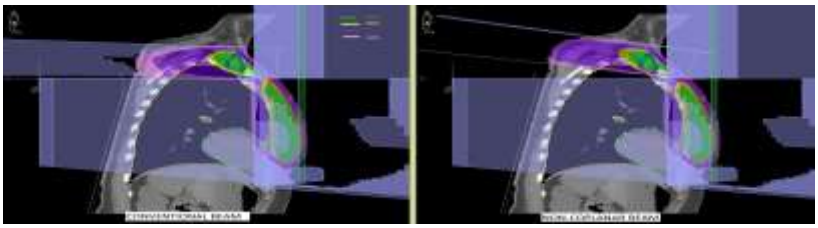

Fig 2: Dose Distribution of conventional and non coplanar plan

Result:

The irradiated lung volume significantly decreased from (54.5 ± 23.4) cc to (18.4 ± 17.36) cc,demonstrating improved dose sparing with the use of a non-coplanar beam arrangement.

	Left Lung (cGy)							Both Lungs	MU
Plan	D20%	D5%	D50%	Mean ± SD	V8 (%)	V10 (%)	V15 (%)	V10	Mean ± SD
CONVENTIONAL	1348.43±379	2329.42±194	172.36±42.0	599.07±100	26.2±4.7	23.7±4.6	18.5±4.4	11.2%±2.2	537±15
NON-COPLANAR	1180.22±387	2070.22±620	140.35±38.6	555.47±106.3	23.1±4.8	21.4±4.6	17±4.2	10.15%±2.1	581±16

For the left lung, the mean dose (555.47 vs. 599.07 cGy), as well as V8, V10, and V15, along with D20% and D50%, were all lower with the non-coplanar technique, indicating enhanced sparing in the low-dose regions. Similarly, the total lung exhibited reduced mean dose, V10, and D50% values with the non-coplanar approach. While the mean dose to the chest wall remained nearly equivalent between techniques, the V95% SCF received a lower dose with the non-coplanar method. No substantial difference was observed in cardiac dose sparing between the two techniques. The contralateral breast received a slightly reduced mean dose with the non-coplanar plan and monitor units (MU) for the chest wall were comparable. However, a higher MU was required for the SC fossa in the non-coplanar approach (581.39 vs. 537.38), which may result in a longer treatment time.