

COMBINING IMRT AND DIBH FOR THE TREATMENT OF MEDIASTINAL LYMPHOMAS: WHAT'S THE BENEFIT?

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Background: Radiotherapy plays an important role in the treatment of Hodgkin lymphoma (HL). However, long term survivors treated with mediastinal RT have an increased risk for the development of cardiovascular disease and secondary cancers. Efforts have been made to reduce the rates of late toxicity and promising results have been published with intensity modulated radiation therapy (IMRT) and deep inspiration breath-hold (DIBH). Patients with HL are often young with good respiratory function, enabling the use of DIBH.

Objective: To evaluate the potential benefit of combining IMRT with DIBH to decrease cardiac and lung dose in mediastinal RT.

Material & Methods: Three patients with cervical and mediastinal lymphoma involvement received involved site radiotherapy (ISRT) with 30 Gy in 15 fractions. Each patient underwent a planning CT scan in free-breathing (FB) and DIBH using a 5 point thermoplastic mask. IMRT plans for FB and DIBH were created and compared with respect to PTV coverage and doses to organs at risk.

Results: Patient 1 had a large PTV volume extending downwards into the anterior mediastinum reaching the cardiophrenic space while patients 2 and 3 had disease only on the upper mediastinum. Mean heart dose was lower with DIBH in all patients (~22-52%). Greater lung expansion was achieved with DIBH which contributed to lower mean lung doses (~14-18%) and lung V20 (~20-28%). Higher absolute decreases on mean heart and lung doses were seen on patient 1. PTV coverage (D95, V95) was similar for both plans in all patients. DIBH-IMRT was chosen for treatment delivery on patients 1 and 2.

Discussion: Significant decreases on heart and lung doses can be achieved while not comprising PTV coverage. Patient anatomy and disease extension will determine the degree of dosimetric improvement when using DIBH. Also, appropriate patient compliance is essential to perform DIBH.

Conclusion: Combining DIBH and IMRT can significantly improve doses on heart and lung when using mediastinal RT and thus reduce long-term morbidity. Choice between treatment delivery techniques should be made on an individualized basis.

	Patient 1			Patient 2			Patient 3		
	FB	DIBH	Δ	FB	DIBH	Δ	FB	DIBH	Δ
Mean heart dose (Gy)	15.1	11.8	-22% -3.3Gy	2.5	1.2	-52% -1.3Gy	2.6	1.9	-26% -0.7Gy
Mean lung dose (Gy)	13.9	11.6	-17% -2.3Gy	8.3	6.8	-18% -1.5Gy	8.3	7.1	-14% -1.2Gy
Lung V20 (%)	19.1	13.7	-28%	12.7	10.2	-20%	14.5	10.4	-28%
Lung Volume (cc)	2461	5329	+102%	3315	4061	+23%	2437	3944	+62%

Biography

João António Maia Garcia Fonseca is a Medical Doctor and has completed his studies in Nova Medical School Lisbon in 2014. He is currently in his last year of Residency in Radiation Oncology at Instituto Português de Oncologia de Lisboa which began in 2015. Over the past years, he has presented several posters and oral communications in both national and international conferences. In 2018, he presented poster in ESTRO 37 and 20th ESMO World Gastrointestinal Congress.

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