Long-Term Outcomes of Re-Irradiation in Non-Hodgkin's Lymphoma: A Case of Anaplastic Large Cell Lymphoma

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OVERVIEW/BACKGROUND

A 76-year-old South East Asian man presented with a submental neck lump and right parotid gland enlargement. Further tests confirmed a non-Hodgkin's lymphoma;CD30 positivity and ALK negativity. The disease was at stage 2 at the time of diagnosis, indicating localized but multiple site involvement. Extensive treatment was given with chemotherapy and radiotherapy over the next 13 years (2011-2025). Following the first relapse, early implementation of local radiotherapy was initiated and may have contributed to prolongation of overall survival. We aim to explore if early radiotherapy combined with systemic therapy can improve clinical outcomes for patients with anaplastic large cell lymphoma without extended toxicity.

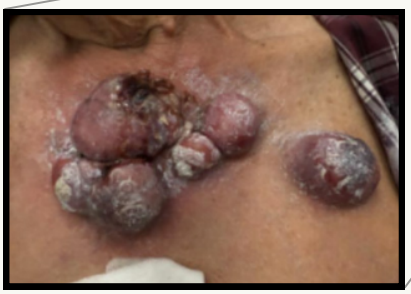

Figure 2:Chest wall lesion in 2025

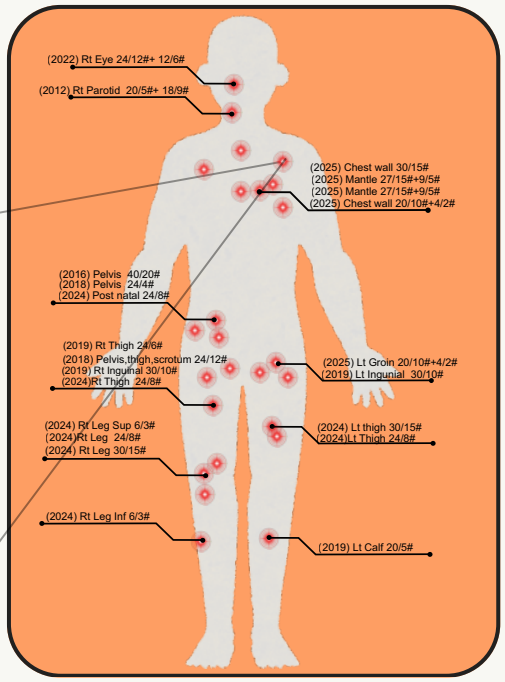

Figure 1: Overview of treatment sites

METHODS

Radiation was delivered using a combination of 3D conformal radiotherapy (3D-CRT) and electron therapy. Repeat treatment dose distributions were exported and processed in MIMvista for cumulative dose assessment.

To account for differing fractionation schemes, individual plan doses were first converted to EQD2, after which deformable image registration was performed to transfer the EQD2 dose distributions on the primary CT and generate cumulative organ-at-risk (OAR) dose maps. Skin doses were measured using a 2 mm internal structure, and the resulting images were registered and reviewed in MIMvista. Bolus' present during scanning were masked and assigned to air with MIMvista to ensure skin and contour match accuracy.

RESULTS

The patient demonstrated excellent clinical tolerance throughout multiple radiotherapy courses, with all organ-at-risk (OAR) doses remaining well within established safety constraints. Comprehensive follow-up through 2025 indicated a high quality of life, with the patient expressing a positive attitude toward the convenience and perceived effectiveness of the treatment.

Ocular and Visceral post-treatment evaluations showed no evidence of radiation-induced cataracts. However, given the patient's age, long-term ophthalmic surveillance is recommended to monitor for potential earlier onset. Similarly, doses to the bladder (Mean: 12.29 Gy) and lungs (Mean: 12.92 Gy) were well below OAR limits. No genitourinary toxicities were reported, and while no symptomatic pneumonitis was observed, ongoing respiratory surveillance is advised as it is still too early to determine the final clinical endpoint.

Skin acute effects were mild and managed effectively without treatment interruption. Despite significant cumulative doses in overlapping regions—specifically a maximum dose of 69.93 Gy to the chest wall and 65.64 Gy to the pelvis—there were no instances of skin ulceration or breakdown. Notably, no Grade 3 toxicities were observed even with short intervals between treatments in overlapping areas.

To achieve a high degree of precision in assessing cumulative exposure, MIMVista was utilized to mask the bolus and conform the skin contours. This approach allowed for a more accurate measurement of skin dose overlap and volumetric distribution, ensuring that the reported doses reflect the true physiological exposure across varied treatment sites including the pelvis, extremities, and chest wall.

Table 1: Dosimetric comparision of different overlapping OARs

OAR	Dose	Endpoint
Rt Lens(2022)	Max: 36.73Gy	Radiation-induced cataract
Bladder (2016+2019)	Mean:12.29Gy	Genitourinary toxicity
Lung(2025)	Mean:12.92Gy	Symptomatic Pneumonitis
Skin overlap (Pelvis) (2016-18)	Max:65.64Gy D2cc:63.48Gy	Ulceration
Skin overlap (Extremities)(2024)	Max:64.49Gy D2cc:62.76Gy	
Skin overlap (Chestwall)(2025)	Max:69.93Gy, D2cc:38.2Gy	
Skin overlap (Pelvis) (2024-2025)	Max:51.26Gy D2cc:22.26Gy	

DISCUSSION

Early integration of re-irradiation with systemic chemotherapy achieved durable local control and rapid symptom control in this case treating refractory non-Hodgkin's lymphoma.The patient tolerated repeated radiotherapy courses well, with low organ-at-risk doses, mild manageable acute skin effects, and no grade 3 skin ulceration through follow-up to 2025. Acute skin effects were mild and manageable, and the patient maintained a good quality of life throughout treatment. This favorable toxicity profile suggests that carefully planned re-irradiation—using 3D planning techniques to minimize dose to organs at risk—can be performed safely in selected patients. Low dose splash was also greatly reduced with this technique. Future directions for this study include prospective studies or pooled multicenter series are needed to better define selection criteria, optimal timing, dose regimens, and combined modality sequencing for re-irradiation in refractory lymphoma.

These findings support considering early, carefully planned re-irradiation integrated with systemic therapy as a salvage option for selected patients with symptomatic localized recurrence. Limitations include single-case design and limited long-term toxicity data; prospective series are needed to define optimal patient selection, timing, and dose strategies.

CONCLUSION

Early re-irradiation combined with systemic chemotherapy provided effective local disease control and symptomatic relief in this refractory lymphoma case. Early integration of re-irradiation with systemic therapy should be considered as a salvage strategy to achieve local control and potentially improve progression-free and overall survival. Follow-up demonstrated that the patient tolerated repeated courses of radiotherapy combined with systemic therapy very well, with low organ-at-risk doses and favorable skin dose tolerance.

Figure 3: Representation of masking bolus thorugh MIMVista