

Proton radiotherapy for mediastinal Hodgkin lymphoma: theoretical background and clinical experience

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INTRODUCTION

Radiotherapy plays an important role in the treatment of Hodgkin lymphoma (HL). RT omitting is associated with the suboptimal results for significant group of patients. The use of the most safe radiotherapy (RT) technique is crucial. Proton therapy (PT) is a modern radiation technique based on the use of particles. Compared to conventional radiotherapy, PT allows higher protection of healthy tissues. This is associated with lower risk of the significant acute toxicity (radiation pneumonitis, severe dysphagia) and late toxicity (cardiovascular disease, secondary malignancies).

METHODS

Between May 2013 and December 2019, 129 patients (pts) received mediastinal PT via pencil beam scanning (PBS) technique. Seventy-three patients were analyzable for acute toxicity and treatment response due the sufficient long follow-up. Median follow-up was 44.5 months (23.4-79.7 months), median age at the time of RT was 32.2 years (18.5-79.2 years). Dose median was 30 GyE (20-40 GyE). RT for PET positive disease had 13 pts. Deep inspiration breath hold (DIBH) technique was used in 57 patients, others under free breathing condition after 4D control.

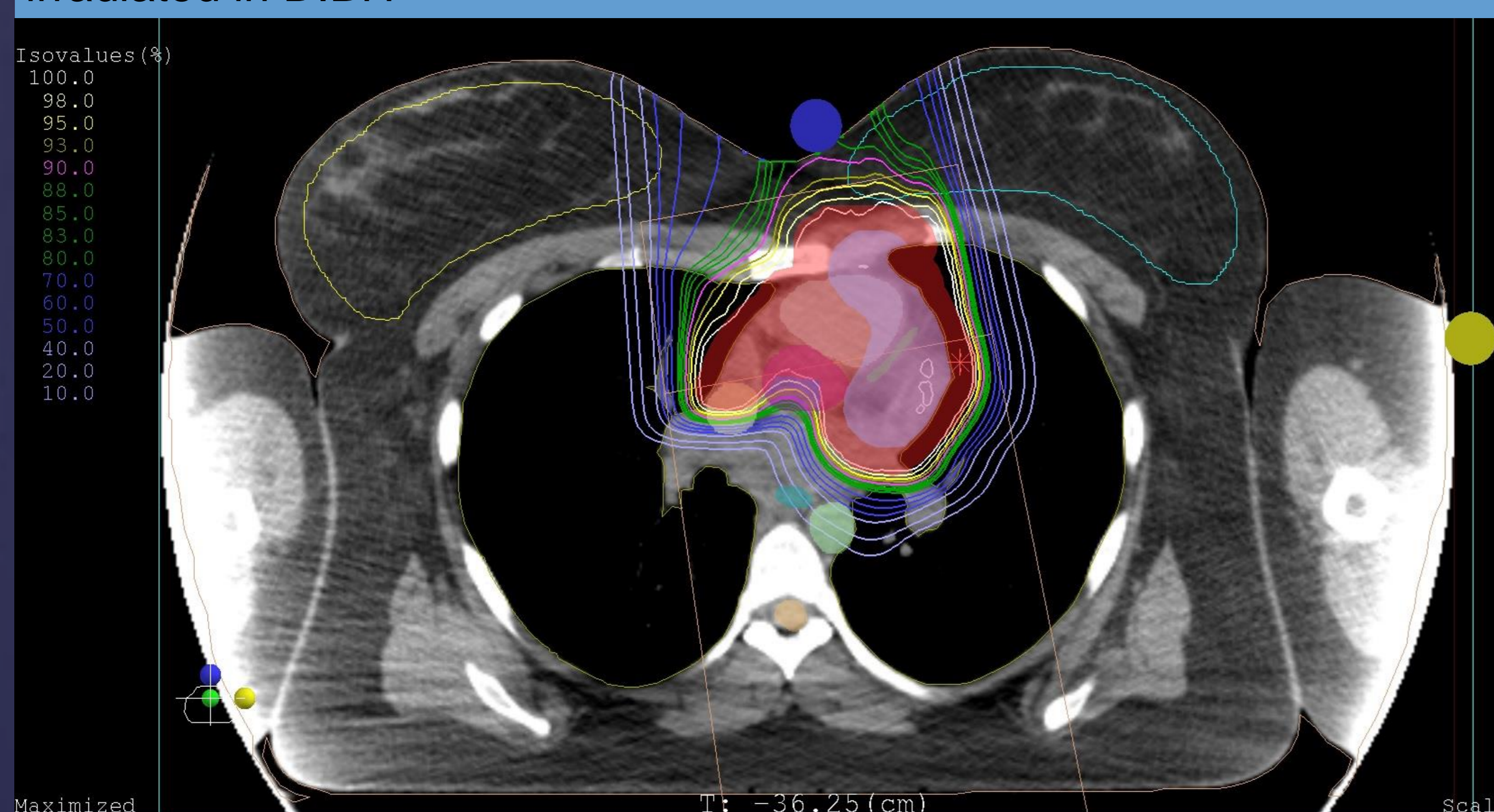
Table 1. Characteristic of patients (n=73)

Males/females [pts.]	28/45
Age in time of RT median [years]	32.2(18.5-79.2)
RT volume [pts.]	
Involved field	9
Residual disease	15
Involved site	49
Median follow-up [months]	44.5(23.4-79.7)
RT on PET neg/PET positive disease/unknown [pts.]	56/13/4
RT in DIBH/FB [pts.]	57/16
Median dose [GyE]	30 (20-40)

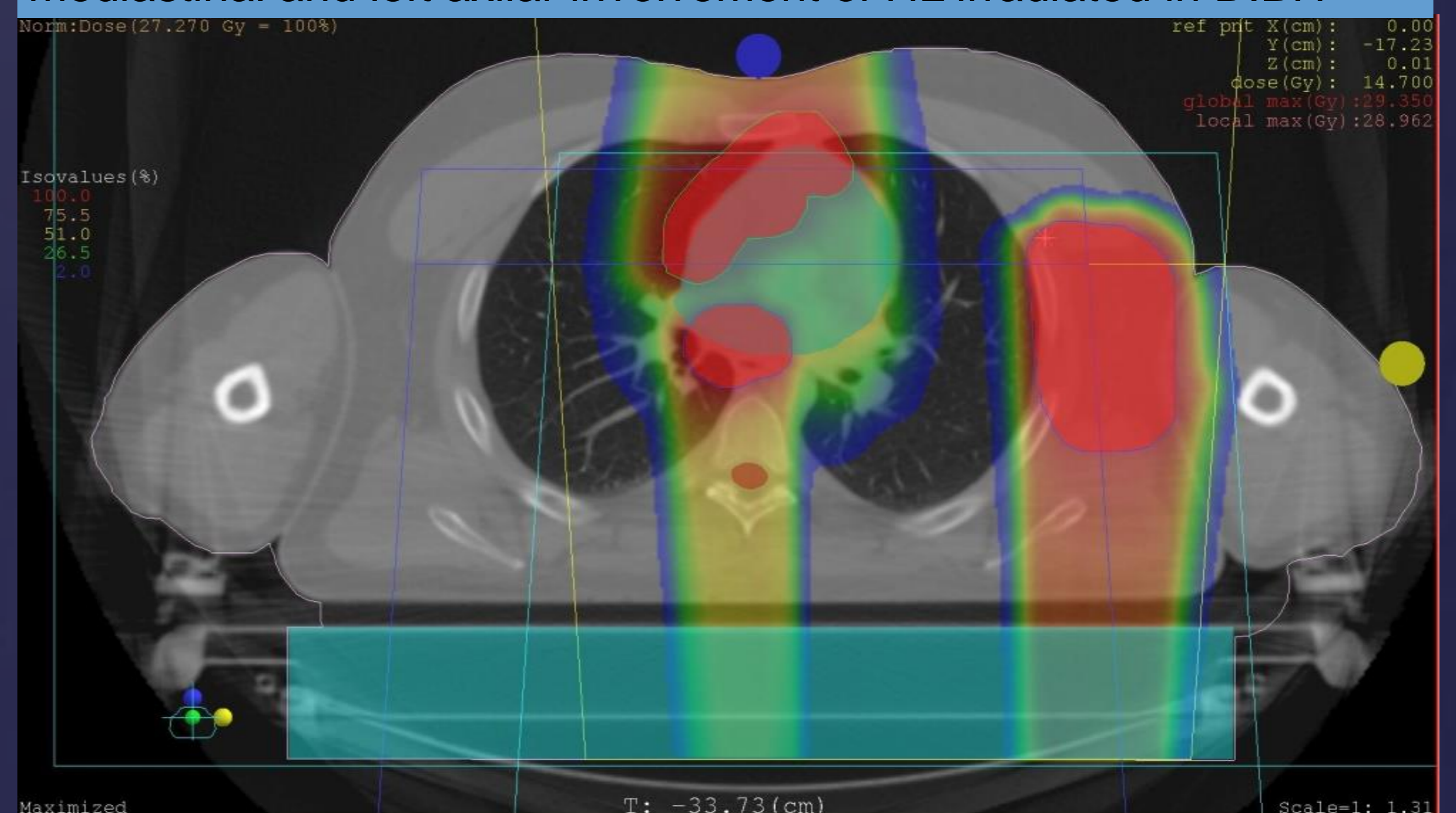
Treatment position of patient in DIBH using system SDX (Dyn'R)



Dose distribution in 22-years old female with mediastinal HL irradiated in DIBH



Dose distribution in 24-years old male with anterior and posterior mediastinal and left axillar involvement of HL irradiated in DIBH



RESULTS

Treatment results

Seventy-two (98.2%) pts have achieved **local control**, 1 pt with unproven in-field and distant progression (declines all medical procedures after restaging PET/CT, alive 27 months after RT completion without symptoms of HL). **Seventy-one pts (97.2%)** alive in **complete remission**, with 1 pt salvaged via allo-SCT, 1 pt progressed on salvage therapy, 1 pt with unknown status as mentioned above. There was observed **latency in metabolic response** in some patients (6-12 months after RT completion), mostly in pts with **necrotic bulky mediastinal disease**.

Toxicity

Acute toxicity was mild, mostly dysphagia, radiodermatitis, transient xerostomia, dysgeusia. No case of symptomatic pneumonitis was observed. No patient required growth factor application or blood supplementation. To date, we hadn't case of Lhermitt's syndrome or late pulmonary toxicity.

CONCLUSIONS

PT offers safe possibility for mediastinal RT. PT via PBS in deep inspiration breath hold is to be the most sparing radiotherapy approach for mediastinal lymphoma. Our clinical data support this statement.