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Lattice Radiotherapy (LRT) for Advanced Non-Small CellLung Cancer (NSCLC): Early Experience

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Abstract
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Abstract

Objective: To report Lattice Radiotherapy our clinical experience for the treatment of advanced bulky lung tumors.

Methods: LTR is a technique of delivering inhomogeneous doses of radiation to bulky tumors, with a maximum dose(V2percentage) of 15 Gy in a single fraction in at least 4 points inside the GTV, and with low doses between at thesame time. Treatment is delivered in one-day follows with daily conventional fractionation. Target volumes wereGTV, CTV, PTV and RVR (Remaining Volume at Risk) but we also considered Lattice specific volumes as LTV (LatticeTumor Volume), VTV (Vertices Tumor Volume) and VV (Valley Volume). LTV was defined inside the GTV excludingcertain critical structures as large vessels, air or main bronchus. The VTV contour is a set of 1 cm spheres placedinto the LTV with a minimum of 4. Between January 2020 to present, we treated 11 patients with NSCLC bulky lung tumors (5 ADC, 5 SCC and 1 LargeCell Carcinoma). Mean age was 67 years old (Range 54-79). The main inclusion criteria in our protocol was GTV greater than 45 cc, secondary criteria were unresectable tumor,inoperable patients or unfit patient for exclusive systemic therapy. A Lattice boost of 15Gy was delivered within the first five days of radiation treatment. Volumetric-arc-therapy(VMAT) irradiation technique with daily Cone-Beam CT (CBCT) was employed in all patients to achieve a total doseof 55 Gy with 275 cGy/fraction in 20 days in PTV. Nine of the patients received concomitant chemotherapy.

Results: Our preliminary results in this unselected group of patients with bulky NSCLC demonstrated that LRT was welltolerated in all patients. Nine patients (81.1%) received concomitant chemotherapy. In spite of the short follow-up,complete response in PET-CT was reported in two patients (18.2%), CT evaluation show response >50% in sixpatients (54.5%) and stable disease in other two patients (18.2%). Patients had a rapid response that required fivepatients needed adaptive planning 10 days after initial LRT. Treatment response could not be evaluated in twopatients who died immediately after the end of the treatment. Only one patient had local progression and threehad developed systemic progression. One patient died from immunotherapy toxicity. No additional treatment toxicity was reported.

Conclusion: Our experience is consistent with the published literature. SFRT-LRT is a safe and effective treatment technique, without toxicity and high local response in poor prognosis bulky NSCLC. However, more investigation is needed toconfirm these promising preliminary outcomes.