

A General Overview of Our Clinical Experience with LATTICE Radiation Therapy

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Abstract

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Abstract

Objectives:

The Lattice Radiotherapy (LRT) allows to treat unresectable bulky cancers with an heterogeneous high-gradient dose distribution and a safe dose escalation, thanks to multiple localized high-dose vertices (Vs) created within the tumor volume (TV). LRT enhances its action inducing bystander and abscopal effects. It can be used in palliative or exclusive mode. We describe our almost two years experience with LRT.

Methods:

From December '22 to September '24 we treated 29 patients (pts) with bulky tumors. From 1 to 32 cylindrical or spherical Vs were created in the tumor volume, with a diameter of 1 cm and a separation of 1.5/2 cm between each vertex and the next in the axial plane, using a geometric arrangement created by a grid tool of the Treatment Planning System. We used Monte Carlo algorithm and VMAT radiotherapy. Tumor volume ranges from 13,695 cm³ to 1417,608 cm³. Vs volume ranges from 0,413 cm³ to 42,544 cm³. In 3 cases a moving-strip technique was used, because the tumors were really bulky (for example, a right leg's sarcoma of about 24 cm). Mean Vs/tumor volume ratio was 2,84%. The doses ranges from 6 Gy/1 fr to 60 Gy/30 fr to the entire tumor and from 12 Gy/1 fr to 60 Gy/4 fr to the Vs. We planned to achieve a goal of $\geq 95\%$ prescription dose coverage to at least 95% of the targets. The constraints for Organs At Risk normally employed were used.

Results:

25 pts completed the treatment without toxicities and interruptions, 4 pts ended the treatment a few sessions earlier. LRT allowed to deliver ablative doses without excessive toxicity to the surrounding normal tissues, compared with standard treatment. We observed remarkable relief of initial symptoms (dyspnea, pain, functional impotence) after the treatment and, where follow ups were available, reduction of the tumor volume and SUV values. Tumor reduction ranges varies from 8 to 45 mm (mean 25 mm), SUV reduction ranges from 3.7 to 15.6 (mean 9.5). We noted abscopal effect in one patient, on surrenal and rib metastasis. This patient is NED after 18 months.

Conclusion(s):

After almost two years, LRT confirmed its safety and efficacy and it can be used for the treatment of bulky cancers, thanks to the delivery of a very high dose inside the tumor and an higher local control without adding any extra toxicity in the peripheral normal tissue. We hope to add more pts to our experience and increase our knowledge of this technique to optimize its use in the clinical practice.