PRECISION RADIOTHERAPY FOR CENTRALLY LOCATED NON-SMALL CELL LUNG CANCER (NSCLC)

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BACKGROUND

Molecular analysis of lung tissue toxicity can be performed using radiotherapy dose volumetric parameters (DVP).

Minimizing the percentage of volume of bilateral lung parenchyma (exclude tumor) receiving dose more than 20Gy (V_{20}) and 5Gy (V_5) and minimizing the mean lung dose (MLD) was proven to be effective to reduce the incidence of radiation induced pneumonitis (RP).

AIM OF THE STUDY

To analyze the lung tissue toxicity between volumetric-modulated arc therapy (VMAT) with single-planer beam arrangement (SP-VMAT), and VMAT with dual-planer beam arrangement (DP-VMAT) based on DVP.

METHOD

A retrospective study was conducted for 17 patients who were treated for stage III centrally located non-small cell lung cancer.

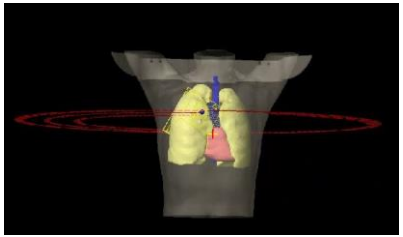
Prescription to give 60Gy to PTV in 30 fractions.

RADIOTHERAPY PLANNING

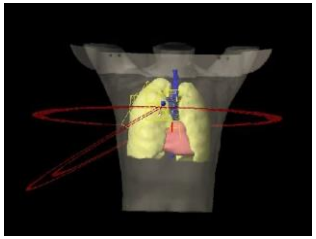
Single planar vs Dual planar VMAT planning was conducted on the identical CT image data sets

Radiotherapy thoracic DVP to planned target volume (PTV) (including Dmax, Dmean, Dmin, $D_{98\%}$ (Gy), $D_{95\%}$ (Gy), $D_{50\%}$ (Gy), and $D_{2\%}$ (Gy)) and DVP to both lungs excluding tumor (V_{20} , V_{10} , V_5 , and Dmean) were retrieved from SP-VMAT and DP-VMAT. Non-parametric paired-T test were used for data analysis.

SP-VMAT



DP-VMAT



RESULT

There was no significant difference between all DVP to PTV in both SP-VMAT and DP-VMAT plans, suggesting both SP-VMAT and DP-VMAT plans were clinically acceptable.

For DVP to both lungs (excluding tumor), the V_5 of SP-VMAT (67.95% ± 14.65) was significantly lower than that of DP-VMAT 71.41 ± 11.83, p=0.006).

For ipsilateral lung, Dmean, V_{10}, V_5 of SP-VMAT was 24.46Gy ± 5.55, 63.48% ± 14.88 and 71.98% ± 16.18 respectively, which were significantly lower than that of DP-VMAT 25.63Gy ± 5.03, 69.8%±11.73 and 79.73%±11.8.

CONCLUSION

The SP-VMAT in this study showed more favorable DVP in both lungs and ipsilateral lung for centrally located NSCLC.

The features of dose distribution can be applied in precision medicine in oncology.

DECLARATION OF INTERESTS

I have no financial interest to declare

MOLECULAR ANALYSIS FOR PRECISION ONCOLOGY VIRTUAL CONGRESS MAP