Cureus

Open Access
Abstract

Cureus

The Dosimetric Effects of Photon Energy on the Quality of Volumetric Modulated Arc Therapy (VMAT) for Lung SBRT

Leila Tchelebi [1]

1. Radiation Oncology, New York Methodist Hospital

Corresponding author: Leila Tchelebi, ltt9001@nyp.org

Categories: Medical Physics
Keywords: stereotactic body radiotherapy, lung cancer, treatment planning, volumetric modulated arc therapy (vmat)

How to cite this abstract
Tchelebi L (June 16, 2016) The Dosimetric Effects of Photon Energy on the Quality of Volumetric Modulated Arc Therapy (VMAT) for Lung SBRT. Cureus 8(6): a67

Abstract

Objectives: There is little published data on the optimal energy to use to minimize doses to OARs, while maintaining adequate PTV coverage in lung VMAT SBRT.

Methods: 35 lung lesions in 33 patients were treated at our institution by VMAT SBRT. Dosimetric plans using 6-MV and 10-MV energies were generated for each lesion. The median dose was 5000cGy delivered over 3-5 daily fractions. Various dosimetric parameters were recorded for both the 6-MV and 10-MV plans and the patients were stratified according to the tumor to chest wall distance (TCW), the tumor location (central versus peripheral), patient AP diameter, and the diameter of an equivalent sphere encompassing the patient's body over the distance of the PTV.

Results: There was a statistically significant difference between 6-MV and 10-MV with respect to the sum lung dose, which favored 6-MV plans ($p=0.04$). For those stratified by TCW, there was a difference in conformity index for patients with peripheral tumors ($p=0.04$). For the group stratified by AP separation, there was a difference in mean sum lung dose favoring 6-MV ($p=0.01$). In the group stratified by equivalent sphere diameter, there were statistically significant (SS) differences in lung V13, mean sum lung dose, and conformity index, all favoring 6-MV plans ($p=0.05$, $p<0.01$, and $p<0.01$). For the cohort overall, and within each subgroup, there was a SS difference in the total number of MUs, which consistently favored planning with 10-MV.

Conclusions: With the exception of thinner patients, for which 6-MV plans was superior with respect to OARs and conformity index, 10-MV should be considered for use in lung VMAT SBRT. 10-MV plans consistently resulted in fewer total MUs. Fewer MUs results in shorter treatment times, with the potential for improved target accuracy due to less intrafractional tumor motion.

Open Access
Abstract
Published 06/16/2016

Copyright
© Copyright 2016
Tchelebi. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 3.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Distributed under
Creative Commons CC-BY 3.0