

AbstractID: 8767 Title: Acceleration of Tomotherapy treatment delivery by increasing pitch and decreasing modulation

Purpose: To determine the feasibility of reducing Tomotherapy treatment delivery time by planning with increased pitch and reduced modulation factor (MF).

Method and Materials: Twelve patients with Tomotherapy treatment sites (head/neck, prostate, prostate/nodes, lung) and fraction size of 1.8–2.5 Gy originally planned with a low pitch (< 0.3) and fast gantry period (< 20 s) were replanned. The first replan increased the pitch to 0.43 and used the original MF (MF_0). If the first replan was acceptable and the gantry period increased, the patient was replanned again with pitch = 0.43 and a lower MF to reduce treatment time. This was repeated until the plan (DVH) became unacceptable or the gantry period reached its minimum (15 s). If the first replan was not satisfactory or if the gantry period did not increase, the MF was increased by 0.5 to improve the plan and to test if the treatment time was still reduced.

Results: For all patients, we were able to produce a DVH comparable to the original DVH using pitch = 0.43 and MF_0 . When comparing the original DVH to the accelerated plan DVH that most closely matched it, treatment times were reduced by 13-66%. Comparing these accelerated plans to the original plans showed the PTV median dose increase 0.4 ± 0.5 Gy, insignificant changes in target coverage and homogeneity index, an average change in critical structure median dose of -0.8 ± 1.3 Gy, and a maximum critical structure median dose increase of 1.3 Gy.

Conclusion: Faster treatment times can be achieved by planning with increased pitch and reduced modulation. Treatments planned with pitch = 0.43 and MF_0 showed little or no plan degradation and most had faster treatment times. Further reduction in treatment time was possible by reducing the MF.

Conflict of Interest: Some of the authors have financial interest in TomoTherapy, Inc.