AbstractID: 11174 Title: Evaluation of IMRT plans between Linac and Helical Tomotherapy based on Dose Volume Indices and normal tissue sparing in prostate cancer patients.

Abstract

Purpose: The objective of this study was to evaluate and quantify the dosimetric gains of linac-based sliding window IMRT technique versus Helical Tomotherapy (HT) in terms of Conformity Index (CI), Homogeneity Index (HI), and normal-tissue sparing for prostate cancer patients

Methods and Material: Eight locally advanced, non metastatic, prostate cancer patients were selected for this study. Volume delineation was done on contrast enhances CT scans with 5mm slice thickness Target volumes included PTV74 (prostate and seminal vesicle) and PTV55 (pelvic lymph nodal regions) and Organs at Risk (OARs) were contoured. The PTV74 volume ranged from 79.8 cc to 177.85 cc (mean 121.02 ± 28.9 cc), while PTV55 ranged from 431.08 cc to 941.52 cc (mean 677.78 ± 185.06 cc).
The prescription doses were 74 Gy/37# and 55 Gy/37# to 95% of PTV74 and PTV55 respectively.

Results: Mean CI ± SD for PTV74 were 0.69 ± 0.06 and 0.77 ± 0.06 with IMRT and HT respectively (statistically significant, p=0.025). The mean CI for PTV55 were 0.43 ± 0.04 and 0.57 ± 0.07 with IMRT and HT respectively (p=0.21). Mean HI ± SD for PTV74 were 0.07 ± 0.02 and 0.04 ± 0.01 for IMRT and HT plans respectively (p=0.012) while for PTV55 mean HI were 0.2 ± 0.09 and 0.06 ± 0.02 for IMRT and HT respectively (p=0.012). HI was statistically superior with HT than with IMRT for both PTVs. OARs sparing in HT was statistically superior in rectum (p=0.025**),** Femoral Heads (p_r=0.012, P_l=0.017) and statistically non significant difference in mean dose of bladder (p=0.18), small bowel (p=0.33) compare to conventional IMRT.

Conclusion: Helical Tomotherapy plans revealed better Conformity Indices and Homogeneity Indices compared to sliding window IMRT technique for PTV74. Overall, the HT plans also spared the OARs significantly more than the IMRT plans except the small bowel.