



Contribution ID: 160

Type: Poster

Comparison of the equivalent uniform dose (EUD) in prostate cancer for target and organ at risk (OARs) between 3D+IMRT and IMRT treatment techniques

Thursday, 22 June 2017 10:30 (5 minutes)

In radiation therapy (RT) of localized prostate cancer, the main organs at risk (OAR) are bladder and rectum. In this study, rectum and bladder doses for 19 patients were analyzed. The treatment plans were generated with the Intensity Modulation Radiation Therapy (IMRT) and 3-Dimensional Conformal RT (3DCRT) + IMRT techniques. CT simulation was performed with full bladder and empty rectum. Radiation therapy oncology group (RTOG) guidelines were used to contour the pelvic and periprostatic nodes. Total prescribed dose was 76 Gy in 38 fractions. Prescribed dose was administered in two phases. In phase-I, treatment plans were generated with 46 Gy to planning target volume (PTV1) (pelvic nodes, seminal vesicles and prostate) with IMRT and 3DCRT. In phase-II, remaining 30 Gy was prescribed to PTV2 (seminal vesicles and prostate) with IMRT technique only. 7 treatment fields were used to generate the IMRT treatment plans with sliding window technique in both the groups. Mean volumes of rectum and bladder for 19 patients were 32 cm³ and 151 cm³ respectively. Doses for rectum and bladder were compared for two tolerance levels at D<15% and D<50% following the RTOG dose volume histograms (DVH) constraints for prostate RT. The rectal and bladder doses were briefly calculated and compared for the IMRT and 3D+IMRT treatment plans. In 3DCRT+IMRT treatment plans, 15 % more doses were found in rectum and bladder for D15% as compared to IMRT treatment plan alone. Likewise 25% difference was measured in rectum and bladder doses when compared for D50% in 3DCRT+IMRT versus IMRT treatment plans. Rectum and bladder gets more doses when treated with 3DCRT as part of radiotherapy for prostate carcinoma patients when compared with IMRT alone. IMRT is better modality in terms of reducing the OARs doses prostate carcinoma and also help to escalate the dose without compromising the OAR doses.

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Session Classification: Thursday morning - Poster Presentations - Screen5

Track Classification: Radiobiology