

AbstractID: 10844 Title: Adaptive Planning due to Daily Dose Variations in Bladder and Rectum with Image-Guided Radiotherapy

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PURPOSE: To study the daily variations in bladder and rectum during a course of definitive prostate radiotherapy and evaluate the necessity of adaptive planning for patients.

METHODS and MATERIALS:

Two patients who finished the hypofractionated radiotherapy with the prescribed dose 60 Gy in 20 fractions were selected to have the retrospective analysis. Daily MV-CT images were obtained and registered. Contours of bladder, rectum and prostate were redrawn. The delivered doses of bladder and rectum were recalculated. In order to sum the cumulative doses of these two organs, the demons algorithm was used to register the daily image sets to reconstruct the total delivered doses.

RESULTS:

The rectum volumes in simulation were 85.85 cc and 84.67 cc for patient 1 and 2 respectively. During treatment, their average volumes were 136.8 cc (± 38.6) and 127.9 cc (± 30.1). The mean rectum volume encompassed by the prescription dose was 14.3% less in patient 1 and 46.6% more in patient 2. The mean bladder volumes in treatment were 6.8% less (166.2 ± 18.7 cc) and 4.5% more (124.3 ± 39.6 cc) for patient 1 and 2 compared to their simulation volumes. The bladder volumes encompassed by the prescription dose were 14.3% and 12.5% higher in patient 1 and 2 respectively. The demons algorithm was used to register the daily MV-CT image set to the first fraction MV-CT image set.

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CONCLUSIONS:

Significant variations of bladder and rectum doses were found during the course of prostate treatment. These variations can be 'blurred' out during a protracted, fractionated radiotherapy because of the randomness of these variations. They can be significant in hypofractionation radiotherapy. Cumulative doses can be obtained through demons algorithm and adaptive plans can be generated by using the adaptive tool.