In this study, the interplay between intrafractional prostate motion and helical tomotherapy (HT) radiation delivery with respect to treatment planning parameters, such as jaw size and pitch factor, was investigated. Four treatment plans were created using two jaw widths (i.e., 1.05 and 2.5 cm) and two pitch factors (i.e., 0.287 and 0.574). A phantom with a slit for a film, attached to the motion platform, was used to simulate two-dimensional prostate motion in the superior-inferior and anterior-posterior directions. Doses were measured using gafchromic EBT films in the sagittal position. Each treatment plan was delivered to the static and dynamic phantom. Dose measurements performed with the dynamic phantom were quantitatively compared to static phantom doses in terms of dose-area histograms (DAH) for the planning target volume (PTV) and prostate, percentage of prostate and PTV receiving the prescription dose, and the minimum dose received by 95% of the prostate. Larger jaw width (2.5 cm) provided more adequate coverage of the PTV and prostate: D(95) of the moving prostate was 1.9 Gy for both plans with the jaw size 2.5 cm. When the jaw size was 1.05 cm, D(95) of the prostate and the PTV dropped to 1.5 Gy and 1.4 Gy, respectively. For a given jaw size, prostate and PTV dose coverage do not appear to be significantly dependent on the pitch factor. In the absence of an optimal motion management technique, the correct choice of the planning parameters is important to overcome...
larger under- and overdosage caused by intrafractional prostate motion during HT.