Purpose: To clinically evaluate the intra-fraction motion management performance of an IGRT protocol established for hypo-fractionated SBRT prospective Phase IIa trial for the treatment of localized prostate cancer. Specifically, to analyze patient data to determine the adequacy of imaging frequency.

Methods: Novalis Tx equipped with Exactrac was used for stereoscopic imaging and localization based on three implanted fiducial markers. For intra-fraction motion management, two nearly 360-degree RapidArcs were split to four half-arcs. Following initial Exactrac positioning, CBCT is obtained for volumetric evaluation of bladder and rectal filling and position confirmation. The patient is then stereoscopically imaged prior to the delivery of each half-arc and repositioned when 2 mm tolerance is exceeded. Data from 66 patients with 330 fractions and 2597 image pairs has been analyzed.

Results: Following the initial Exactrac and CBCT, mean treatment time from first arc to treatment end was 6.7 mins. Over the course of 66 treatments, patients were repositioned on 257 occasions. On average patients were repositioned 11.9% of the time (SD 10.0%, range 0-40.5%). The mean distance these patients were repositioned was 3.5 mm (SD 1.7 mm, range 2.0-8.5 mm). Of all repositions, 53.5% (SD 29.2%, range 0-100%) occurred before delivery of first arc; in addition, patient repositioning frequency following any half-arc was 9.1% (SD 9.9%, range 0-45%) over the treatment course. Nine patients did not require repositioning throughout the treatment course while nine patients required repositioning more than 25% of the time.

Conclusions: Current imaging protocol for intra-fraction motion management fits the clinical workflow. Frequency analysis indicates that the intra-fraction imaging is not excessive. Due to the time spent on performing and analyzing the additional CBCT after initial Exactrac localization, 53.5% of repositions occur preceding first arc. Future analysis will include quantitative dosimetric consequences and tolerances utilized for repositioning patients in this study.

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