

Purpose: To compare Aperture-based (AB) and Beamlet-based (BB) inverse treatment plans for prostate cases. The plans are compared for total monitor units, number of segments, treatment time and plan quality.

Methods and Materials: Ten patients were planned using both Elekta PTI Precise and the CMS XIO planning systems. For the Precise system, the apertures used in the optimization process were determined a priori by considering target and critical structure anatomic geometry. The XIO system used the BB approach with segmentation software to establish final apertures. The same target and critical structure dose constraints were used for the inverse planning for both systems. Seven gantry angles were used for the AB plans, and both seven and five angles were used for the BB plans. The prescribed dose was normalized to provide coverage to 95% of the PTV. Patient records were reviewed to determine overall treatment time.

Results: Plans were evaluated by comparing the achievement of IMRT constraints. No significant variation in plan quality was found for the two planning techniques. The average MUs for AB was 337(range of 302.1-374.5) compared to 386.8(317-491.4) for 5-field BB plans and 394.2(312.6-508) for 7-field BB plans. The average number of segments for AB was 47.6(37-56) compared to 61.4(36-79) for 5-field BB plans and 78.1(53-111) for 7field BB plans. The average treatment times were lower for the BB plans (10.66min) compared to (11.48min) AB plans.

Conclusions: The quality of the AB plans compared favorably with the BB plans. The AB plans had a small advantage in both total MU and segments, while the BB plans delivered more quickly. This result may be due to degree of delivery automation for the BB approach. This work points to the possibility of exploiting the use of AB planning for adaptive treatment.