

AbstractID: 3898 Title: Improvement in IMRT delivery for head and neck patients using simplified IMRT plans and enhanced IMRT delivery system

Purpose:

To demonstrate the feasibility of simplified IMRT plans and improved delivery times without significantly degraded plan quality.

Method and Materials:

Five patients with nasopharynx tumors were selected for evaluation. The plan quality was assessed based on tumor coverage, multiple defined endpoints for sensitive structures, plan dose conformality and homogeneity index. The treatment plans were generated using direct machine parameter based optimization in a commercial treatment planning system. The numbers of beam angles varied from 7-9. For each plan, the average total numbers of segments were gradually reduced from 98, 63, 48, to 24, while maintaining the planning dose constraints and number of beam angles. Treatment times are based on the latest IMRT delivery option (console 9) installed on a Siemens LINAC.

Results:

Improvements are two-fold: (1) reduction of segments and (2) technical changes within the delivery system. All plans achieved the same tumor coverage, delivering >95% of tumor volumes to 70Gy (GTV), 59.4Gy (CTV), and 54Gy (elective CTV) simultaneously. As the number of segments decreased from 98 to 24, the average maximum doses to the brainstem changed from 50.8, 50.4, 51.3, to 55.1 Gy and from 41.9, 42.2, 41.5 to 42.3 Gy to the spinal cord while the average mean parotid doses were 27.0, 26.7, 26.7, and 28.5Gy. As the total number of segments decreased, the average plan conformal indices were 0.63, 0.61, 0.65, and 0.46, and the average dose homogeneity indices were 89%, 87%, 88%, and 84%. Optimized communication within the LINAC control system reduced the inter-segment delay from six to two seconds.

Conclusion:

For patients with nasopharyngeal tumors treated with IMRT, 50 segments might be sufficient to achieve clinical requirements. With the latest IMRT delivery system, the treatment time excluding patient setup can be reduced to 6-8 minutes.

Conflict of Interest:

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