AbstractID: 11012 Title: Initial Experience with Philips SmartArc on an Elekta Linac

Purpose:
The recent introduction of delivery control systems capable of delivering intensity modulated arc therapy (IMAT) has led to renewed interest in arc-based IMRT delivered on a conventional linac. A key challenge to successful implementation of IMAT is the need for robust inverse planning tools capable of properly accounting for IMAT delivery constraints. In this work, we evaluate a new IMAT planning module, called SmartArc, designed for the Pinnacle^3 treatment planning system.

Method and Materials:
In February 2009, we received an alpha version of the SmartArc planning module for the Pinnacle^3 treatment planning system. The SmartArc tools were developed by RaySearch and build on the existing direct machine parameter optimization (DMPO) functionality in Pinnacle^3. The SmartArc module was used to create 9 IMAT plans (4 head-and-neck, 2 lung, and 3 prostates). Each plan was verified on an Elekta Synergy with the PreciseBeam VMAT delivery control system using the IBA Matrixx 2D ionization chamber array. Each plan was compared with a corresponding fixed-field IMRT or helical tomotherapy plan in terms of both plan quality and delivery efficiency.

Results:
A single arc was sufficient to produce highly conformal IMAT treatment plans for the prostate and lung cases. On average, the prostate plans required 536 monitor units and delivered in 1.9 minutes while the lung plans required 750 monitor units and delivered in 2.2 minutes. For the more complex head-and-neck cases, the use of two arcs was necessary to meet the treatment goals and an average of 607 monitor units and 5.4 minutes were required.

Conclusion:
The SmartArc module in Pinnacle^3 serves as a robust IMAT planning tool capable of planning both single arc and multiple arc deliveries. 2D gamma analysis showed that all plans verified with greater than 95% of the measured points meeting our 3%/3mm criteria.

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