

AbstractID: 11762 Title: Fluoroscopic Verification of Intensity-Modulated Rotational Arc Therapy Delivery

**Purpose:** Intensity modulated rotational arc technique requires verification of leaf positions, gantry angle and dose rate in the entire arc. This study shows how to achieve this with a detailed verification of Varian RapidArc using a fluoroscopic electronic portal imaging device (EPID).

**Materials and Methods:** Three Rapid Arc plans (prostate 1, whole pelvis 1, and head and neck 1) are delivered on a Trilogy linac (Varian Medical Systems, CA). During delivery, approximately 600 fluoroscopic portal images are acquired (~8 images/s) per arc with a PV-aS1000 EPID, without use of secondary phantoms or blocks. Each leaf position of each gantry angle is calculated from the acquired EPID images offline. Gantry angle information of each portal image is acquired from the dynalog file generated during beam delivery. Leaf positions from the dynalog file are compared to scheduled positions from the DICOM RT plan file.

**Results:** Online EPID image acquisition of Rapid Arc delivery is prompt, involving extension of the EPID system and beam delivery time. The measurement error depends on the displacement of EPID system relatively to the center of rotation, which is only 1mm-1.5 mm. Offline analyses show the accuracy of leaf positions for static leaf and gantry field are better than 1 mm. More than 98.5% of leaf sequences exhibit less than 3mm deviations, 83 % show 2mm and 56% for 1mm.

**Conclusions:** Position of each leaf of each gantry angle for Rapid Arc delivery is verified within 1 mm accuracy with fluoroscopic portal images. Use of fluoroscopic EPID images can be considered as a practical QA tool for the verification of the Rapid Arc delivery.

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