

AbstractID: 13982 Title: Using an Electronic Portal Imaging Device for patient-specific Volumetric Modulated Arc Therapy Quality Assurance

Purpose: To implement a patient specific Quality Assurance (QA) method to verify gantry specific individual Multi-Leaf Collimator (MLC) apertures (control points) in Volumetric Modulated Arc Therapy (VMAT) plans using an Electronic Portal Imaging Device (EPID). **Method and Materials:** RapidArc treatment plans were generated on Eclipse treatment planning system (TPS). DICOM images from a Varian EPID (as1000) acquired in continuous acquisition mode were used for pretreatment QA. Each DICOM file contains the grey scale image of the MLC aperture related to its specific control point and the corresponding gantry angle. The TPS MLC file of this RapidArc plan contains the leaf positions for all the 177 control points. In-house software was developed that interpolates the measured images and overlays them with the MLC pattern at all control points. The 50% isodose line was used as the edge of MLCs on the portal images. **Results:** The software generates graphs and tables that provide analysis for the number of mismatched leaf positions for a chosen distance to agreement (DTA) at each control point and the frequency in which each particular leaf mismatches for the entire arc. Five patients QAs were analyzed using this method. Even for a very complex plan 80% of the active leaves passed the 3 mm DTA criteria. We found that maximum and minimum number of mismatched leaves occurred at a gantry angle of 180° (IEC) and 0° respectively. The leaves with the highest mismatched rate are treatment plan dependent. **Conclusion:** This in-house software automatically verifies the MLC leaf positions for all the control points of Rapid Arc plans. The leaf edge positions of the detected segment are compared with the calculated positions specified by the TPS and it was found that number of failures depends on complexity of the treatment plan and gantry angle.