AbstractID: 11744 Title: IMRT QA using a hybrid Mapcheck / Electronic Portal Dosimetry Environment

Purpose

2D array detector planar dose verification systems play an important role in pre-treatment quality assurance of IMRT plans. In the present study, we are demonstrating a hybrid IMRT pretreatment QA environment using Varian's aS500 & aS1000 electronic portal imaging devices (EPID) in conjunction with Sun Nuclear analysis tools.

Materials & Methods

5 patients for prostate [minimally modulated], brain [moderately modulated] and head and neck [heavily modulated], each with IMRT plans generated with Eclipse Treatment Planning system were used in this study. The plans were designed for sliding-window IMRT dose delivery technique on a Varian 6 MV linear accelerator fitted with millennium MLC. An individual verification plan per field was generated from the clinically approved plans. Portal dosimetry treatment plans were also generated in a standard manner assuming 1 CU = 100 cGy. The results were compared with Mapcheck measurements.

Results

The percentage of detectors passing 3%/3mm criterion as well as the CAX dose measured by the system and the computed plan in absolute dose values were determined for evaluation purposes. For minimal or moderately modulated IMRT plans, both the planar dose verification systems gave comparable results in terms of passing rates [3%/3mm >90%] as well as CAX deviations [<2%]. For heavily modulated head and neck treatment plans, the 3%/3mm passing rates of EPIDs [mean =93.3%] were similar to Mapcheck [mean=85.1%]. For EPID, CAX deviations were not included in this study as the CAX in majority of the cases fell on the penumbra regions of the dual carriages fields.

Conclusion:

It is possible to use MapCheck analysis software, considering the contemporary gold standard for IMRT QA, with EPID-acquired portal images of IMRT fields. In case of heavily modulated fields, detector size as well as detector spacing influenced the systems performance with EPID showing better results, as expected.