AbstractID: 6499 Title: Dosimetric comparison under a central shielded area between conventional and dynamic MLC blocking with modified intensity fluence

Introduction

Central blocking is needed for some radiotherapy treatments, like the mantle field. Typically central blocking is done with cerrobend. Dynamic MLC can be used to generate a central shielded area. When MLC are used dynamically the movements of the leaves can control the fluence to compensate the dose at certain depth and also it can generate a central shielded area by bringing the intensity to cero.
The objective of this work is to make a dosimetric comparison between conventional and dynamic MLC (dMLC) fields with CAX shielding.

Method and Material

A 6MV linac Clinac 21EX, equipped with a 120-leaf MLC and a TPS Eclipse v6.5 (Varian) were used. Four plans were simulated on a square phantom, each with a single field (SSD=90cm), with different shielding shapes: square, circle, pyramid and rhomb. For each plan a surface compensator was used to compensate the dose at the isocenter plane and the resulting optimal fluence was modified to generate the same central shielding. All plans were normalized at the same point. Point dose, profiles and 2D dose measurements were done at the isocenter coronal plane using ionization chamber and film dosimetry. RIT software v4.2 was used for film analysis.

Results

For each shielding shape the agreement of CAX dose was less than 1% between conventional and dMLC. For crossplane and inplane profiles the agreement was 2%, except for regions under the conventional block due to inhomogeneities or geometrical positional errors (<2mm). For non square shielding shapes the penumbra of dMLC fields increased due to MLC steps and optimal fluence beamlet size. Measured versus calculated dose for dMLC fields showed less than 5% of points with γ>1 (2%/2mm).

Conclusion

Dynamic MLC can generate isolated central shielding to replace a conventional block. The dose under conventional central block and dMLC generated shielding is comparable.