عنوان مقاله:

Validation of Leaf Design Characteristics of an Add-on Automated Multi Leaf Collimator for Telecobalt Therapy Machine

محل انتشار:

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خلاصه مقاله:

Background: In developing countries like India, cobalt-۶۰ machines still find their applicability, considering the cost and maintenance issues. With a view to deliver conformal treatment plans using teletherapy machines, an automated Multi-Leaf Collimator (MLC) was developed for the existing machines as a retrofit attachment to the collimator assembly without any modifications to the unit. Objective: This study aims to investigate the radiation characteristics of leaf designs incorporated in two add-on prototype MLC systems with respect to the shape of leaf projected at the isocenter plane and the isodose distribution around the target. Besides, the dosimetric characteristics of prototype MLC with divergent leaf design are validated through simulation and experimental measurements.Material and Methods: In this experimental study, two add-on prototype MLC systems were designed and fabricated. The characteristic measurements of leaf designs incorporated in both the prototypes were carried out using Gafchromic films (GAF) and compared with Monte Carlo (MC) simulations. For divergent leaf design, beam profiles were obtained using Monte Carlo simulations which are complemented with the results obtained from measurements of radiochromic films and ionization chamber (IC) profiler. Dosimetric characteristics like radiation field width and beam penumbra were evaluated. Results: The Monte Carlo simulated data are in agreement with experimental data from IC profiler as well as from Radiochromic films. The results of this study are well within acceptable tolerance limits. Conclusion: The prototype MLC system designed for existing telecobalt machines supports its clinical applicability for conformal therapy to better manage treatment in rural areas, which can provide superior cost effective treatments.

کلمات کلیدی:

Developing countries, Monte Carlo Method, Cobalt-۶۰, MLCs