عنوان مقاله:

The Quality Control of Intensity Modulated Radiation Therapy (IMRT) for ONCOR Siemens Linear Accelerators Using Film Dosimetry

محل انتشار:

مجله فیزیک پزشکی ایران, دوره 9, شماره 2 (سال: 1391)

تعداد صفحات اصل مقاله: 15

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خلاصه مقاله:

Introduction Intensity Modulated Radiation Therapy (IMRT) has made a significant progress in radiation therapy centers in recent years. In this method, each radiation beam is divided into many subfields that create a field with a modulated intensity. Considering the complexity of this method, the quality control for IMRT is a topic of interest for researchers. This article is about the various steps of planning and quality control of Siemens linear accelerators for IMRT, using film dosimetry. This article in addition to review of the techniques, discusses the details of experiments and possible sources of errors which are not mentioned in the protocols and other references. Materials and Methods This project was carried out in Isfahan Milad hospital which has two Siemens ONCOR linear accelerators. Both accelerators are equipped with Multi-Leaf Collimators (MLC) which enables us to perform IMRT delivery in the step-and-shoot method. The quality control consists of various experiments related to the sections of radiation therapy. In these experiments, the accuracy of some components such as treatment planning system, imaging device (CT), MLC, control system of accelerator, and stability of the output are evaluated. The dose verification is performed using film dosimetry method. The films were KODAK-EDR2, which were calibrated before the experiments. One of the important steps is the comparison of the calculated dose with planning system and the measured dose in experiments. Results The results of the experiments in various steps have been acceptable according to the standard protocols. The calibration of MLC and evaluation of the leakage through the leaves of MLC was performed by using the film dosimetry and visual check. In comparison with calculated and measured dose, more that 80% of the points have to be in agreement within 3% of the value. In our experiments, between 85 and 90% of the points had such an agreement with IMRT delivery. Conclusion The EDR2 films are suitable for quality control of IMRT. According to complexity of the quality control for IMRT, the physicists of each center have to develop specific guidelines according to their equipments and limitations. An accurate treatment planning system with capability of inverse planning is an essential need for IMRT. The result of the planning system has to be compared with experiments in various situations.

کلمات کلیدی:

Film Dosimetry, Intensity Modulated Radiation Therapy, Quality Control