Comparison of the skin dose in TPS with the phantom measurement for the head and neck radiation treatment patients

Department of Radiation Oncology, Asan Medical Center*

Seung Mo Hong*, Sung-woo Kim*, Byungchul Cho*, Youngmoon Goh*, Changhwan Kim*, Minsik Lee*, Jun-Bong Shin*, Doheui Lee*, KyoungJun Yoon*, Seonyeong Noh*, Seokyoon Kang*, Jungwon Kwak*, Chiyoung Jeong*, Min-Jae Park*

Purpose:

Head and neck cancer patients are radiation-treated on the couch tops with thermoplastic mask for the immobilization of patients. However, dose perturbation is occurred by the mask and leads the change of surface dose. To minimize the dose perturbation by the thermoplastic mask and skin dose, accurate dose calculation on TPS (treatment planning system) is required. Skin dose was underestimated in TPS compared to the measurement on phantom. This study aims to avoid the underestimation of the skin dose by body immobilization devices on TPS (Varian Eclipse 15.6, AAA algorithm) compared to the phantom measurement.

Materials and Methods:

When drawing the external body contour along the skin surface in Eclipse, the pixel spans both inside and outside the skin, and as a result, it can be considered that the radiation dose value calculated in TPS is interpolated to the median value of the inside and outside the skin and decreases. Therefore, it is reported that the accuracy of calculating the dose value in the skin is effectively improved when the starting point of the calculation is moved away from the skin. The calculated skin dose was compared to the phantom measurement using OSLD (optically stimulated luminescent dosimeter).

Results:

The skin dose calculated in TPS and measured using the phantom were matched with the expanded body contour. The optimal body contour expansion margin was found in order to reduce additional dose calculation time.

Conclusions:

We have experimentally verified the underestimation of skin dose calculation in TPS when the radiation treatments using body immobilization devices. Skin dose can be accurately calculated with the expanded body contour and can be utilized to reduce the skin damage.

Keywords:

surface dose, contour, margin expansion, TPS, body immobilization devices, TG-176