Evaluation of skin surface dose for head and neck cancer patients treated with intensity-modulated radiation therapy using in vivo dosimetry

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서 론

Use of intensity-modulated radiation therapy (IMRT) for head and neck cancer is gradually increasing, because it could facilitate more sophsticated treatment of target volumes and reduction of acute and late sequelae. However, theoretically, there is a potential risk of increased skin surface dose resulting from multiple obliquity effects caused by multiple tangential beams. Moreover, we sometimes confronted with more skin reactions in the patients treated with IMRT than conventional techniques. In this study, we evaluated skin surface dose adjacent to the target volumes to verify whether the use of IMRT would increase the skin dose more than we predicted.

재료 및 방법

A total of three patients who were treated with IMRT for head and neck cancer was included in this study. Disease sites were as follows : one with base of tongue cancer, one with tonsillar cancer, and one with nasopharyngeal cancer. Median age was 56 years. All of the patients were treated to the cervical lymph node regions due to the gross nodal disease and/or elective nodal irradiation. Treatment planning was performed by nine field IMRT for all of the three patients. We measured skin surface dose at the different three points per each patient with maximum two times. In vivo dosimetry was performed with MOSFET.

결과 및 고찰

Prescribed target dose of each patient was 160 cGy, 212 cGy, and 210cGy, respectively. Mean measured surface skin dose of each patient was 39.83 (range, 23.9-64.1) cGy, 59.7 (range, 51-66.5) cGy, and 49.07 (range, 41.5-61.7) cGy, respectively. Mean measured surface skin dose was mean 25.5 (range, 14.9-40.1) percent of prescribed adjacent target dose.

결 론

This study had shown that the use of IMRT did not increase the skin surface hot point dose. The measured skin surface dose was 20 to 40percent of the adjacent target prescription dose, and was within acceptable dose range. Our study had some limitations with small number of experimental patients and methodological problems. Potential risk of increasing skin dose with bolus effect of aquaplaster should be examined in the future trials. In addition, the accurate set-up verification should be maintained because of steep dose gradient between skin surface and target volumes within a short distance in the head and neck cancer patients.

참 고 문 헌

1. E.J. Hall, *Radiobiology for the Radiologist*, 5th Ed., pp. 124-135, Lippincott, Philadelphia (2000)
2. 2. Qi ZY, Deng XW, Huang SM, Zhang L, He ZC, Li XA, Kwan I, Lerch M, Cutajar D, Metcalfe P, Rosenfeld A. In vivo verification of superficial dose for head and neck treatments using intensity-modulated techniques. Med Phys. 2009 Jan;36(1):59-70.
3. Varadhan R, Miller J, Garrity B, Weber M. In vivo prostate IMRT dosimetry with MOSFET detectors using brass buildup caps. J Appl Clin Med Phys. 2006 Nov 28;7(4):22-32.