

The Exploration of Optimizing Intensity-Modulated Radiotherapy Clinical Target Volume in Lower Neck to Protect the Thyroid Gland in Nasopharyngeal Carcinoma

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Abstract

Purpose: To explore the optimization of clinical target volume (CTV) delineation in lower neck to protect the thyroid gland in nasopharyngeal carcinoma (NPC) patients treated with intensity-modulated radiotherapy (IMRT) [1,2].
Materials and methods: Part I (670 patients were included): We tried to find out the extremely low risk sub-areas of lower neck lymph nodes (LNs) metastasis by dividing into six sub-areas (Figure 1) [3,4]. Part II (40 patients were included): According to the research results of extremely low risk sub-areas CTV in part I from different N stages patients, the extremely low risk sub-areas were in lower neck were shrunk, then we made new radiotherapy plans, and last we evaluated the irradiation doses of thyroid in new plans comparing with the control plans (not shrink the lower neck CTV) [5].
Result: In Part I, we found that positive (short diameter 4mm) rate of lower neck LNs was 0% all in 1-5 subregions for N0 patients, in 1-4 subregions for N1 patients and 1-3 subregions for N2 patients [6]. In Part II, results showed that the median thyroid dose and V50 after shrinking lower neck CTV area decreased to 35.3% and 36.9% comparing with 54.1% (P=0.000) and 58.3% (P=0.000) before CTV shrinking; the dose of common carotid artery (V60), esophagus (Dmean) and trachea (Dmean) decreased as well.
Conclusion: The CTV of the lower neck of NPC has a shrunk space: 1-4 subregions can be omitted in N1 patients and 1-3 subregions can be omitted in N2 patients to protect the thyroid and other OARs in lower neck. However, further clinical researches remain needed to confirm whether the dose reductions can be transformed into clinical reductions of toxic reactions and the improvements of quality of life.

References

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