

Purpose: To develop a dose constraint template to increase conformity index (CI) of the planning target volume (PTV) and improve intensity-modulated radiotherapy (IMRT) planning efficiency for patients diagnosed with early stage nasopharyngeal carcinoma (NPC).

Methods and Materials: Twenty patients who were diagnosed with early stage NPC under IMRT treatment were selected in this study. The target volumes for all twenty patients were delineated on CORVUS Treatment Planning System (TPS) by oncologists. We started IMRT planning for the first 10 patients. Two dose limiting regions (Dlrs) around PTV were added by extending 1 cm region from PTV in each direction. All the IMRT plans were created and approved according to the dose constraints criteria in RTOG 0225 protocol. The mean values of end points of the extended normal structures from all 10 patients were chosen as the planning dose constraint template. For the other 10 patients, the IMRT treatment plans were performed either with (Plan1) or without dose constraint template (Plan0) derived from the first group of patients. The dose distribution and CI for PTV were compared for plan 1 and plan 0, as well as planning optimization time.

Results: The clinical target doses from plan 1 were covered well and met the clinical criteria. The doses for normal critical structures of Plan 1 were comparable to Plan0. The CI of Plan1 was increased by 0.08 ± 0.07 and the plan optimization time was decreased significantly. The average planning time for one NPC case was reduced to about 20 minutes excluding contouring time.

Conclusions: The usage of dose constraint template together with Dlrs increases the CI of PTV and improves IMRT planning efficiency without sacrificing of target dose coverage and critical structure sparing for patients diagnosed with early stage NPC.