Purpose:

To propose a new plan quality index to fasten the evaluation and comparison of the competing multi-isocenter SIB-IMRT (intensity modulated radiotherapy with simultaneous integrated boost) plans for NPC (Nasopharyngeal Cancer) patients.

Methods:

Multi-isocenter SIB-IMRT plans at 2.5 Gy/fraction for GTV (gross tumor volume) and 2.0 Gy/fraction for CTVs (clinical tumor volume) with different OAR (Organ at Risk) constraint levels were generated with BrainSCAN 5.2 and m3 MLC. DVH (dose volume histogram) were read from treatment planning system by custom software (written with Matlab7.1). Various items was read and calculated. A plan filter matrix with variable plan quality items was introduced to filter plans that fail to satisfy the customed criteria. PTV plan quality indices including TC (target coverage), V93, HI (homogeneity index), TCP (tumor control probability), and OAR plan quality indices including NTCP (normal tissue control probability), V26, and V32 of parotids were calculated for qualified plans. A unique composite plan quality index (CPQI) was proposed based on the relative weight of these indices to evaluate and compare plans. Plan ranking results were compared with physician's evaluation results to verify the accuracy of this new plan quality index.

Results:

The average CPQI values for plans with OAR constraint level of low, normal, high, and PTV only were 0.22±0.08, 0.49±0.077, 0.71±0.062, and -0.21±0.16, respectively. There were significant differences between these plan quality indices (One-way ANOVA test, p<0.01). This consistent with physician's ranking results with 99.3% OAR high plans accepted.

Conclusions:

Plan filter matrix was able to fasten the plan evaluation process. The new matrix plan quality index CPQI showed good consistence with physician ranking results, it is a promising tool for optimal plan selection.

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There is no conflict of interest for this abstract.