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Radiotherapy for Nasopharyngeal Cancer using Conpensating Filters

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INTRODUCTION

To improve the local control of patients with nasopharyngeal cancer, we have implemented 3-D conformal radiotherapy and intensity modulated radiation therap y(IMRT) to used of compensating filters. Three dimention conformal radiotherapy with intensity modulation is a new modality for caner treatments.

We designed 3-D treatment planning with 3-D RTP (radiation treatment plannin g system) and evaluation dose distribution with TCP(tumor control probability) a nd NTCP (normal tissue complication probability).

METHOD

We have developed a treatment plan consisting four to six intensity modulated photon fields that are delivered through the compensating filters for tumor volu me and partial transmission blocks for critical organs.

We get a full size CT imaging including head and neck as 1.2 to 3 mm slice s, and delineating PTV (planning target volume) and surrounding critical organs, and reconstructed 3-D imaging on the computer windows. In the planning stage, the planner specifies the number of beams and their directions including non-cop lanars, and the prescribed doses for the target volume and the permissible dose of normal organs and the overlap regions. We designed compensating filter accor ding to tissue deficit and PTV volume shape also dose weighting for each field to obtain adequate dose distribution, and shielding blocks weighting by dose tran smission rate for critical organs.

Optimization for the weight distribution was performed iteration with initial gue ss weight or the even weight distribution for each field . The TCP and NTCP by DVH (dose volume histogram) were compared with the 3-D conformal radiot herapy and intensitiy modulated conformal radiotherapy by compensator and blo cks weighting.

RESULTS

Using a intensity modulated conformal radiotherapy with compensating filter, we have customized dose distribution to conform and deliver sufficient dose to the PTV for nasopharyngeal tumor. In addition, in the overlap regions between the PTV and the normal organs (spinal cord, salivary grand, pituitary, optic nerv es), the dose is kept within the tolerance of the respective organs. We evaluated to obtain sufficient TCP value and acceptable NTCP using compensating filters. Quality assurance checks show acceptable agreement between the planned and t he implemented MLC(multi-leaf collimator).

CONCLUSION

Three dimention conformal radiotherapy with intensity modulation is a new mod ality for caner treatments. To compare with the advantage of IMRT and 3-D c onformal radiotherapy, we try to carry out the IMRT by using the compensating filters and partial transmission blocks. We designed the copensating filter and blo ck weighting with 3-D RTP system and evaluation dose distribution with DVH, TCP and NTCP.

IMRT provides a powerful and efficient solution for compex planning problems where the surrounding normal tissues place severe constraints on the prescription dose. The intensity modulated fields can be efficiently and accurately delivered using compensating filters.