Intensity modulated conformal therapy (IMRT) was implemented as a boost treatment for head and neck cancers in order to investigate treatment planning and quality assurance procedures, and to determine the clinical feasibility of the technique as supported by commercial systems interconnected by a computer network. A fixed-gantry IMRT procedure was studied that employed nine coplanar cone-beam fields. A spiral CT scanner was used to acquire a three-dimensional data set for the patient in treatment position. The target volumes and normal anatomic structures were identified using virtual simulation software. A commercial inverse treatment planning system computed the IMRT plans using simulated annealing. The planning system also computed "step-and-shoot" leaf-setting sequences for a commercial dynamic multileaf collimator as well as the monitor units required by the leaf-setting sequences to deliver the prescribed dose to a designated isodose surface. The inverse planning computation required something under an hour of unassisted processing. Quality assurance of the treatment sequences required about 90 minutes using automated instrumentation, and was carried out before the first treatment. Measurements of the dose in a cylindrical water phantom were found to agree with the prescription to better than 5%. Digitally reconstructed radiographs used with portal imaging were helpful for checking the daily setup. The patients could be positioned, the isocenter could be verified, and all nine fields treated in approximately 20 minutes.

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