

A TREATMENT PLANNING COMPARISON OF TWO DIFFERENT 3D CONFORMAL TECHNIQUES FOR IRRADIATION OF HEAD AND NECK CANCER PATIENTS

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Abstract – The purpose of this treatment planning study was to compare two different three dimensional conformal irradiation techniques for head and neck cancer patients.

For 33 patients with head and neck carcinoma, irradiated according to the classical technique, we computed and evaluated a second irradiation technique in order to optimize the treatment planning protocol. The classical technique, termed “electron-photon fields”, employed two lateral semi-fields (23 fractions) for irradiation of the upper part of the planning target volume that should receive 50 Gy (PTV₅₀) and an anterior and posterior field for the lower part. After the 23rd fraction the lateral fields were reduced from the dorsal side (2 fractions), in order to exclude the spinal cord from them. At the same time the dose to the shielded part of the target volume was delivered with matched electron fields. Finally, after the 25th fraction, the high risk volume was irradiated to the desired dose with plan where the spinal cord was completely shielded. In the new technique, termed “oblique photon fields”, 4 oblique isocentric photon fields were used (25 fractions): two anterior fields that covered the entire target volume that should receive 50 Gy and two posterior fields that covered only half of the target volume in order to shield the spinal cord. Thus, the necessity for using electron fields is eliminated. We kept the plan for irradiation of the high risk planning target volume the same as in the classical technique. The prescribed dose per fraction in all plans was 2 Gy. In both techniques the plans were optimized to the same maximal point dose and the same dose to the spinal cord.

The oblique fields plan showed better coverage and homogeneity of the PTV₅₀, except for the patients with positive resection margins receiving postoperative radiotherapy (receiving 66 Gy), where the coverage did not differ significantly. The conformity in both techniques did not differ significantly. The mean dose to the parotid glands was significantly smaller with the oblique fields plan in case of patients with negative resection margins and when all the patients were treated as one group.

The preferred treatment technique is thus the oblique photon fields technique, not only because of the superior dosimetric parameters, but also because of the absence of the electron fields which complicate the entire treatment process from dosimetric as well as practical aspect.