

CLINICAL PAPER /

BRAIN TUMOR



Dose escalation in large anterior skull-base tumors by means of IMRT. First experience with the Novalis system

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ABSTRACT

To evaluate the feasibility and tolerance of dose escalation with stereotactic intensity-modulated radiotherapy (sIMRT) for skull-base tumors.

Between 01/2003 and 12/2004, twelve patients were treated. Nine were exclusively treated at the Novalis site with one planning target volume (PTV) field boost, three were administered boost IMRT treatment (two with each one PTV-shrinking field, one with single PTV) after conventional three-dimensional conformal radiotherapy. This resulted in 23 PTVs with a median volume of 93.63 cm³ (range, 88.58-125.88 cm³). Dose calculation was done by the pencil-beam algorithm. Median total doses of 66.6, 77.4, and 63.9 Gy were prescribed for sIMRT alone, sIMRT after 3-D conformal irradiation of the nasopharynx and cervical lymph nodes with 59.4 Gy, and for reirradiation, respectively.

SUMMARY

95% isodose PTV coverage was reached in 86.5% (range, 80-93%). Homogeneity (Dmax/Dref) was 1.11, 1.09, and 1.08. Median total doses to 50% of chiasm, right and left optic nerve were 16.21, 16.82 and 10.23 Gy. 11/12 patients are locally controlled with a median follow-up of 11 months (range, 3-23 months), one has died of pulmonary embolism after cerebrospinal dissemination of retinal adenocarcinoma.

CONCLUSION

sIMRT enables dose escalation to tumors located close to critical organs. Inverse planning for micro-multileaf collimator stereotactic irradiation is practicable in the daily routine irradiation program. sIMRT needs special verification and still, the following parameters have to be standardized: IMRT dose specification, dose maxima, length of radiation delivery time.