

Proton Therapy of Nasal Cavity and Paranasal Sinuses: The UFPTI Experience

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Purpose/Objective(s)

Thirty-eight patients with tumors of the nasal cavity and paranasal sinuses with skull base extension have completed treatment with proton therapy at UFPTI since January of 2007. The disease characteristics, treatment planning and delivery techniques, and follow-up results are presented.

Materials/Methods

Of the 38 patients, 35 had prior surgery, 17 with positive margins. Three patients had biopsy only. Histology included poorly differentiated carcinoma, sino-nasal undifferentiated carcinoma, adenocarcinoma, adenoid cystic carcinoma, esthesioneuroblastoma, mucosal melanoma and spindle-cell carcinoma. Proton treatment targets and critical structures were delineated from co-registered simulation CT images and diagnostic MR images. The geometric relations between target volumes and critical structures were examined to select optimal proton beam parameters. Proton-specific through- and patch-fields, as well as match fields were used for these patients to achieve target-conforming and critical organ-sparing concave dose distributions. Prescribed doses ranged from 68.4 CGE to 69.6 CGE for post-op negative margins, to 74.4 CGE for positive margins or presence of gross unresectable tumor. A 1.2 CGE twice-a-day fractionation scheme, separated by at least 6 hours on the same day, was used in all patients. Proton treatments were delivered with orthogonal kV x-ray imaging guidance, to achieve 1 mm setup accuracy, for each fraction.

Results

Patient follow-ups ranged from 1 to 29 months, with a mean of 13.1 months. All patients completed their prescribed treatment and tolerated the treatment well. Brisk skin reactions developed in all patients, and resolved within 4 weeks after completion of treatment. Follow-up imaging studies and biopsy revealed in-field recurrent disease in two patients at 9 and 10 months, progressive meningeal seeding in one patient within two months after completion and distant visceral and bony metastasis in three patients between 6 and 12 months after completion. Medial retinopathy occurred within the treated volume in one patient at 11 months after completion of treatment without negative impact on visual acuity.

Conclusions

Our experience suggests that patients with tumors involving the nasal cavity and paranasal sinuses with extension to the skull base will benefit from high-dose conformal proton therapy treatments.