

Title: Proton Therapy for High-Grade Meningiomas at UFPTI

Robert S. Malyapa, Zuofeng Li, Daniel Yeung, William Mendenhall, Nancy P. Mendenhall

Introduction: High-grade meningiomas are aggressive tumors requiring radiation doses above 60 Gy to reduce local recurrence. These tumors often occur where delivery of high-dose is impossible without compromising tolerance of adjacent critical structures. Proton therapy, with its ability to stop the treatment beams completely within the treated volume, allows delivering the high curative dose while respecting tolerance doses of nearby critical organs. Advantages of proton therapy for high-grade meningiomas are demonstrated by three case studies at UFPTI.

Methods:

Immobilization for patients with high-grade meningiomas uses a Base-of-Skull-frame with facemask and bite plate. CT and MRI simulation images of patients are imported into the Eclipse proton therapy treatment planning system for treatment planning. Proton therapy treatments were delivered using double-scattering proton beams. Orthogonal X-ray images are acquired daily to enable accurate and reproducible patient positioning using the Digital Imaging Positioning System. Patient number 1 is a 48-year old male with an atypical meningioma with rhabdoid features arising in the posterior fossa, with extension to the neck through the jugular foramen, s/p biopsy. Patient number 2 is a 56-year old male with atypical meningioma, s/p 4 surgeries, presenting with multi-focal recurrence in the parasagittal and right temporal regions. Patient number 3 is a 30-year old female, s/p subtotal resection, with recurrent atypical meningioma involving the right orbit and sphenoid wing, extending to involve the cavernous sinus and middle cranial and infra-temporal fossa. Proton treatment plans were optimized to deliver the prescription doses of 61.2 CGE at 1.8 CGE/fraction for patient no. 1 and 2, and 60.0 CGE at 1.2 CGE/fraction for patient number 3.

Results and Conclusions:

Dosimetry analysis of patient treatment plans demonstrated that proton therapy is able to deliver the prescribed tumor doses while respecting all critical organ tolerances. Proton therapy shows clear dosimetric advantages over traditional radiotherapy techniques.