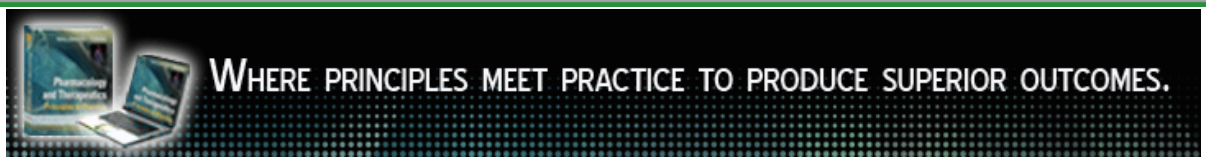

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Clinical Investigation

Proton Radiotherapy for Childhood Ependymoma: Initial Clinical Outcomes and Dose Comparisons

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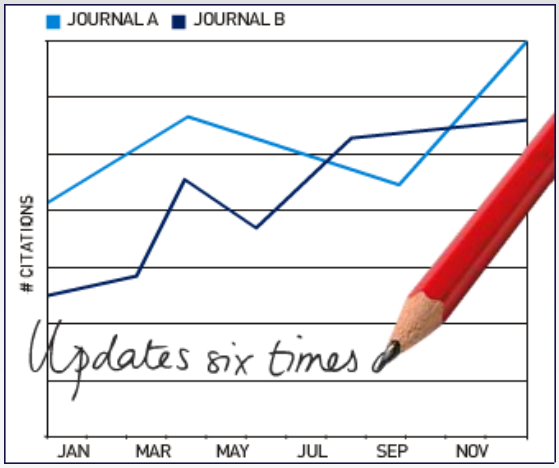
Purpose

To report preliminary clinical outcomes for pediatric patients treated with proton beam radiation for intracranial ependymoma and compare the dose distributions of intensity-modulated radiation therapy with photons (IMRT), three-dimensional conformal proton radiation, and intensity-modulated proton radiation therapy (IMPT) for representative patients.

Methods and Materials

All children with intracranial ependymoma confined to the supratentorial or infratentorial brain treated at the Francis H. Burr Proton Facility and Harvard Cyclotron between November 2000 and March 2006 were included in this study. Seventeen patients were treated with protons. Proton, IMRT, and IMPT plans were generated with similar clinical constraints for representative infratentorial and supratentorial ependymoma cases. Tumor and normal tissue dose–volume histograms were calculated and compared.



Results

At a median follow-up of 26 months from the start date of radiation therapy, local control, progression-free survival, and overall survival rates were 86%, 80%, and 89%, respectively. Subtotal resection was significantly associated with decreased local control (p = 0.016). Similar tumor volume coverage was achieved with IMPT, proton therapy, and IMRT. Substantial normal tissue sparing was seen with proton therapy compared with IMRT. Use of IMPT will allow for additional sparing of some critical structures.

Conclusions

Preliminary disease control with proton therapy compares favorably with the literature. Dosimetric comparisons show the advantage of proton radiation compared with IMRT in the treatment of ependymoma. Further sparing of normal structures appears possible with IMPT. Superior dose distributions were accomplished with fewer beam angles with the use of protons and IMPT.

Author Keywords: Ependymoma; Pediatric brain tumors; Proton beam radiation

Article Outline

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