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Pituitary Hormone Dysfunction after Proton Beam Radiation in Children with Brain Tumors.

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Abstract

Objective: To characterize endocrine dysfunction in pediatric brain tumor patients who received proton beam (PB) radiation, and to compare those treated with PB alone vs combined conventional and PB (Con/PB) radiation. **Methods:** A retrospective chart review of patients ≤ 18 years of age who received PB radiation for a brain tumor from 2000-2008 was performed. Variables analyzed included patient demographics, tumor type, therapeutic modalities, radiation doses, and types and timing of endocrine dysfunction. **Results:** Thirty eight patients were identified, of whom 31 aged 11.8 ± 3.3 years (19 girls) had undergone endocrine evaluation. Of these, 19 received PB and 12 received Con/PB radiation. Cranial surgery was performed in 28 subjects, and 25 received chemotherapy. Average length of follow-up since radiation was 1.8 ± 0.8 years. Nine (47%) patients in the PB and four (33%) in the Con/BP group developed endocrine dysfunction ($p=ns$) following cranial irradiation. Although total radiation doses between the groups did not differ, children with endocrine sequelae treated with PB received fewer cobalt grey equivalents (CGE) than those treated with Con/PB (5384 ± 268 vs 5775 ± 226), $p < 0.01$) and pituitary hormone deficiencies were detected later (1.17 ± 0.4 years vs. 0.33 ± 0.11 years, $p < 0.01$). **Conclusions:** A high rate of endocrine sequelae was seen in our study. Children treated with Con/PB developed endocrine dysfunction faster and received more radiation than those in the PB group. Surgery and chemotherapy were additional risk factors. Large prospective studies are needed to further evaluate the incidence of endocrine sequelae following PB radiation in children.

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